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The AUTOMOBILE

$108,191,774 for Roads in 1914

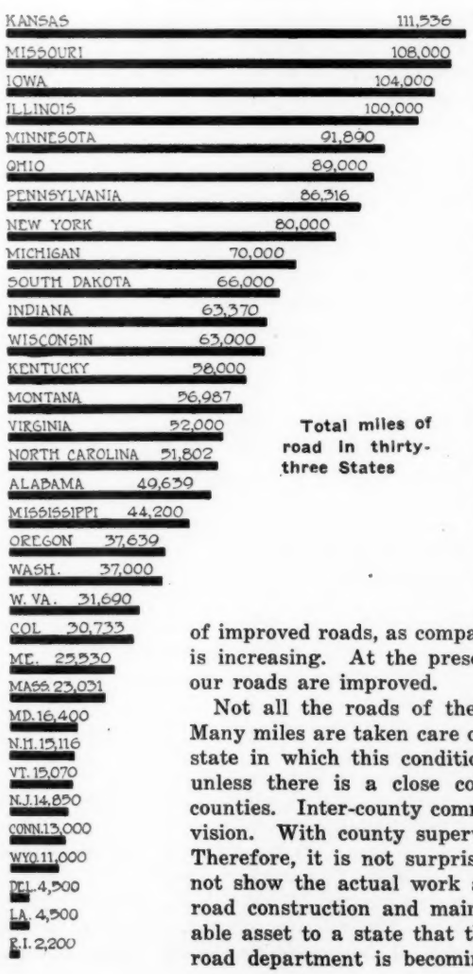
Over 6,000 Miles of New Road Added and Over 35,500 Improved During Year 1914 in 33 States

By J. Edward Schipper

STRETCHED out in a single line the roads of the United States would encircle the globe more than eighty times. Traveling at the rate of 150 miles a day, it would take 36 years, or 13,000 days, to travel their length. The value of these roads is stupendous. At the lowest possible estimate of construction, $1,500 per mile, the value of the 2,000,000 miles of road in the United States is $3,000,000,000, but the sum which has been expended on the construction and maintenance of these roads is so far above this, that it would be impossible to even form the roughest estimate of the true amount of money spent for highways in this country.

Most of our roads have been gradually developed from the forest path to the highway. Even in our largest cities, the pathways that the oldest settlers followed in their trips to and from fresh water springs have been perpetuated in the form of streets. The old stage routes from city to city have become the automobile highways of the present day. Examples such as the old Albany trail, the Boston Post Road and the Boone Way are repeated all through the country. If present indications hold true, the pathways that the Forty-niners marked with the bleached bones of those who perished along the rigorous route will become part of an ocean-to-ocean boulevard.

While these gradual developments of some of our best known highways have been up to within recent years the greatest factor in the development of the highway system of the country, the automobile has introduced another factor which has become preeminently important in the road-building industry: The automobile stands for efficiency and anything with which it has to do follows its lead of well directed effort. The automobile road, unlike the old Indian trail, does not follow a serpentine course, but like the iron railroad path, follows the straight line, the shortest distance between the two objective points. The greatly increased speed of travel has brought the necessity for direct routes and smooth roads. In the days of the horse, the dirt road was good enough; in the day of the automobile—the present time—it no longer suffices. With the speed at the command of the motorist, irregularities in surface must be flattened out before the speed can be used. Rapidly the percentage of improved roads, as compared with the total roads in the country, is increasing. At the present time, approximately 7 per cent. of our roads are improved.



Total miles of road in thirty-three States

Not all the roads of the country are under state supervision. Many miles are taken care of by town and county authorities. A state in which this condition holds true is under a disadvantage unless there is a close cohesion of plan between the different counties. Inter-county communication is assured with state supervision. With county supervision it ought to be, but often is not. Therefore, it is not surprising that records from many states do not show the actual work and the actual results accomplished in road construction and maintenance. The roads are such a valuable asset to a state that the necessity for a well organized state road department is becoming recognized throughout the country.

Map showing number of miles of road in states scattered throughout the Union. The mileage includes all types of roads

More and more the state engineering department keeps its fingers upon the pulse of the road situation and by means of well organized effort and carefully kept statistics are systematically solving the road problem of the state.

Statistics from 33 States

Statistics gathered from the thirty-three states throughout the Union, in which records are carefully compiled, tell an interesting story of what this country is doing to keep its lines of communication from district to district in the best possible condition. In these thirty-three states there are 1,614,999 roads of all kinds. Of these 226,288 are improved, 35,704 miles having been improved during the year 1914. At the rate of 35,000 miles per year, these thirty-three states will have their entire mileage classed under the head of improved roads in less than 45 years. In these states during the year 1914 there were added 6,006 miles of new roads. Before the advent of the automobile, such a thing would have been unprecedented, but now it is becoming a yearly occurrence and gathering impetus as time goes on. In 1912, for example, these same states added over 5,000 miles of new roads and transferred from the classification of Roads of all Classes to Improved Roads more than 35,000 miles.

$108,191,774 in Twenty-nine States

All these improvements mean that money must be spent, and, again, drawing figures from the thirty-three states which are tabulated by name on page 141 the amount which it has been found necessary to expend will be perceived. During 1 year twenty-nine of these states expended $108,191,774. The greatest amount spent by any state was Indiana, which paid out $17,000,000. New York followed closely with $14,638,045; Iowa expended $11,000,000; Colorado spent $9,964,077; Wisconsin paid out $7,000,000; Montana, $8,389,278, and Illinois, $5,500,000. Thus, throughout the entire country it can readily be seen that the realization of the value of good roads is becoming complete. The citizens of these states are backing their knowledge of the necessity of these roads with millions of dollars. They have made the subject of roads of paramount importance in local politics and more careful supervision is being exercised.

Dirt Roads Predominate

America's representative road is still the dirt road—even a large percentage of the improved roads are dirt. Throughout the Union there are probably more than 1,250,000 miles of dirt road. In the thirty-three states from which records are available, there are 1,005,436, and even this is not an exact figure because many miles of highway in one state would be called a road and in another it would not. Even in the State of New York, with its millions of people, there are wild regions throughout the mountainous northern sections where mere trails are known as roads. The natives of this part of the state refer to old abandoned lumber trails as roads; whereas, as a matter of fact, they are impassable for any vehicle heavier than a buckboard. With the understanding that a dirt road, however, is any road composed of natural earth and which is passable in fair weather, the figure is quite accurate.

Among the improved roads the gravel construction is most typical of America, because the materials for its construction are generally quite close to hand and it is, therefore, possible to make good roads at a low cost. Taking the figure totaled from the estimates of the thirty-three representative record-keeping states, there are 78,846 miles of this type of road, or roughly, one-twelfth as many miles as of dirt. Ohio is the leader in gravel road mileage, having more than 14,500 miles of this type of road. Minnesota is next with over 11,400; Wisconsin has 7,000, and even little Rhode Island, with its total of 2,200 miles of roads, has 100 of these in gravel. Some of the states among those which keep careful state records of their highways have no gravel whatever. These are Connecticut, Delaware, Pennsylvania, South Dakota, West Virginia and Wyoming. Some of these states have roads of a composite type which resemble gravel to a great degree, but which are not the true gravel roads.

Macadam is probably the king of the automobile highways. When the average automobilist finds himself upon a newly finished macadam road he generally leans back against his seat and settles down for a period of comfortable riding. Ohio is the leader in macadam mileages, having 3,000 miles more than the second macadam state, Illinois. The respective mileages of macadam roads in these two states is 7,000 and 10,000. Kentucky has 6,000. Massachusetts, with its fine highway system, has 3,783. New York has 3,200, Wisconsin has 2,000, New Jersey 2,600 and North Carolina 1,209. Many states, such as Louisiana, have no macadam roads at all in the state. The total in the thirty-three states considered is 42,499. The other roads which are used to a sufficient degree to be separately classified are not many. Concrete and brick compose the majority of the other improved roads, but these have not reached a sufficiently high figure to be a vital factor when considered against the total. Many states are trying concrete on an experimental basis at the present time and it may be that this material, which has left such a heavy mark upon the building industry, will also be a factor in road development.

15,000 Miles New Road for 1915

To get the greatest mileage of roads at the least possible expense is one of the biggest problems that the state administration has to face. If a man wishes to construct a driveway from his front gate to his garage he is often appalled by the estimates of the contractors who aim to do the work. Yet, he has only 200 or 300 feet of road to construct perhaps and this is not apt to be of a nature to endure any appreciable traffic. When 1,000 miles of road is considered, the amount of money which its construction entails is so great that even a slight percentage of saving in any direction amounts to far more than the salary of the most highly paid engineers. Throughout the country in 1915 there will be perhaps 15,000 miles of road constructed and 35,000 miles improved. Already there have been $40,255,344.31 appropriated in fifteen states. There is no wonder that the road question is one of the biggest factors in internal politics in this country!

Convicts Used in Road Building

One of the big factors in recent years has been the employment of prison labor on the road. In the second annual report of the state highway commission of South Dakota, in making their recommendations to the Governor, the statement is made that the movement to have the prisoners of the state work on the highways has been enacted into a law in the states of California, Colorado, Oregon, Washington, Ohio, Virginia, West Virginia and others with splendid results to all concerned. The state is benefited by the material gain of good highways and by the moral and physical improvements of its charges. The prisoner is benefited from the physical and reformatory standpoint. This experiment has positively proven that the prisoners have profited by the fresh air and sunshine, were willing to work hard and looked forward to the next spring when they might again be so employed.

The Honor Camp

The State of Washington which successfully employs convict labor maintains what are known as Honor Camps. In this state under the indeterminate sentence law, convicts are given a minimum and maximum term and the plan is to place such convicts in the service wherever possible. The scheme is to allow the men a credit of 1 year's time for each 9 months' service on the road, arranging the term of service of the men, that when their 9 months' labor expire they will be discharged. The men are well fed, comfortably clothed and provided with well-equipped sanitary quarters. In general, the men prefer to serve in the quarry rather than in the penitentiary, and the results of their labor show a marked increase in efficiency. It has been found that the average cost of subsistence per man per day is 26.8 cents and the average cost of maintaining each convict per day including guarding, subsistence, clothing, items of general expense, medical,

Table of Highway Statistics of all States in Which Figures are Available

STATE	Total Miles of Roads in State	Total Miles of Improved Road	Miles of New Roads Built in 1914	Miles Improved Road in 1914	Miles of Macadam Roads in State	Miles of Brick Roads in State	Miles of Dirt Roads in State	Miles of Gravel Roads in State	Miles of Other Roads in State	Total Amount Expended for Roads in 1914	Amount Appropriated by State for Road Work in 1915	Remarks
Alabama	49,639	6,955	....	1,183	568	None	3,110	1,000	2,277	$1,878,170.00	$226,067.31	Approximate, as only 10 counties reported.
Colorado	30,733	5,014	....	2,577	....	....	.....	655	25,074	9,964,077.24	130,000.00	
Connecticut	13,000	1,282	332	66	....	....	.....	....	....	4,805,825.25	.....	
Delaware	4,500	400	60	150	160	....	.....	....	....	105,000.00	Bond issue of $70,000 in Kent	
Illinois	100,000	10,000	150	....	7,000	100	90,000	2,500	400	5,500,000.00	400,000.00 to July 1, '15	
Indiana	63,370	26,831	....	....	....	....	.....	....	....	17,000,000.00	.....	
Iowa	104,000	.....	....	10,000	50	None	100,000	1,000	Concrete 7 m.	11,000,000.00	10,500,000.00	
Kansas	111,536	1,170	....	....	220	4	110,366	153	111	5,427,424.00	.....	
Kentucky	58,000	10,600	....	500	6,000	5	47,000	4,000	600	2,000,000.00	2,900,000.00	
Louisiana	4,500	563	....	103	None	None	396	123	44	344,467.33	145,000.00	
Maine	25,530	1,000	None	192	60	None	24,500	940	None	2,900,000.00	900,000.00	
Maryland	16,400	693	233	....	313	9	.....	137	234	3,809,000.00	2,791,000.00	
Massachusetts	23,031	18,773	....	....	3,783	....	11,068	7,729	450	1,368,072.00	.....	
Michigan	70,000	3,000	....	700	647	....	53	1,570	167	687,000.00	.....	
Mississippi	44,200	12,000	....	400	50	....	43,530	500	....	3,500,000.00	.....	
Minnesota	91,890	9,934	....	3,000	....	....	73,512	11,401	....	3,809,792.00	1,480,000.00	
Missouri	108,000	4,750	....	....	....	....	103,250	3,500	....	.....	.....	
Montana	56,987	2,000	1,500	200	25	None	All	5,000	....	8,389,278.70	.....	
New Hampshire	15,116	1,026	150	....	9	None	16	120	6	244,158.00	650,000.00	
New Jersey	14,850	5,000	125	125	2,600	10	9,850	2,100	140	4,370,000.00	4,000,000.00	
New York	80,000	5,200	900	1,500	3,200	86	50,000	9,000	397	14,638,045.00	13,934,277.00	
North Carolina	51,802	10,000	1,476	2,534	1,209	....	41,670	698	5,519	4,500,000.00	895,000.00	
Ohio	89,000	25,000	....	....	10,000	500	64,000	14,500	....	.....	.....	
Oregon	37,639	4,964	90	295	962	None	32,689	3,745	243	3,060,000.00	240,000.00	
Pennsylvania	86,316	1,892	65	7,029	1,521	101	.....	....	271 bitum.	3,538,506.90	.....	
Rhode Island	2,200	550	None	325	450	....	1,650	100	....	156,000.00	.....	
South Dakota	66,000	30,000	150	2,000	20	....	65,980	....	....	579,948.00	1,224,000.00	
Vermont	15,070	4,000	....	200	....	....	14,000	900	....	.....	.....	
Virginia	52,000	2,916	....	855	876	....	381	475	1,184	1,767,010.00	.....	
West Virginia	31,690	825	200	300	500	25	30,865	....	300	3,000,000.00	.....	
Wisconsin	63,000	15,000	300	1,350	2,000	2	55,000	7,000	1,000	7,000,000.00	1,250,000.00	
Wyoming	11,000	2,000	....	....	....	....	.....	....	....	.....	.....	
Washington	37,000	2,950	275	60	160	25	32,550	3,700	....	1,850,000.00	.....	
Total	1,614,999	226,288	6,006	35,704	42,499	867	1,005,436	78,846	38,769	$108,191,774.42	$41,735,344.31	

escapes and transportation is 74.5 cents per day, giving a total cost of maintenance per convict per day of $1.83.

Washington's Pledge System

Working of convicts on highway under which has been called the honor system is an experiment in which the State of Washington has probably operated the most extensively of any state in the Union. Each convict signs the pledge of honor that for the clemency extended by the Governor and the state Prison Board for permitting him to work in the honor camp and the payment of 50 cents for each day's labor he agrees to perform such work as may be assigned to him and not to leave the camp without permission. Upon the acceptance of the conditions of the pledge, the Governor issues a conditional pardon to each man. The disposition of the honor men toward the system is in general very favorable. The freedom of the camp and the life in the open appeals to the men with the results that the work is done well and very few fail to keep their trust.

Bridges Bring Up Cost

Bridges are one of the big factors in raising the cost of road construction and in some states are a serious factor owing to the large number of small streams which must be crossed. In the State of Minnesota, for example, there are 20,603 bridges over 10 feet in length. The roads in this state are largely under the jurisdiction of counties, but in 1914 a new law went into practical effect which gave direct state supervision. However, the cost of the roads is to a large extent borne by the counties under the state aid system in which the state furnishes a part of the money required for road building. The county of Murray, which is 704 square miles in area, has 568 of these bridges, or in this county, in other words, for every twenty inhabitants there is a bridge. In the county there are 1,200 miles of road, or 9.8 people for each mile of road. To look at it from another angle there is a bridge for every 2.1 miles of highway. It is evident that road construction in counties such as these will be an expensive undertaking, and this is only a random example which is probably exceeded in many parts of the Union.

Kansas Leads in Mileage

The greatest road state in the country is Kansas with 111,536 miles. It has increased from 98,000 in 1912 when it was in fourth place. Missouri, which in 1912 had the highest mileage in roads, has now dropped in second place with 108,000, the same number it had at the end of that year.

Movement Is Nation-Wide

Iowa is now third with 104,000 miles of road; in 1912 it was second with 102,000 miles. Illinois has dropped from third to fourth place since 1912, having 100,000 miles of road. Thus there are continual changes in the mileages of the states, but one prevailing factor dominates the entire road building situation. This is the relative percentage of improved roads to total roads. Slowly this figure is advancing up the scale as the enlightened legislative bodies perceive the necessity for good roads. In 1912 the percentage of improved roads, as compared with total miles of roads, was a little over 6 per cent. In 1915 it is about 8 per cent. The advance is nation-wide. It is being demanded by farmers, manufacturers and merchants. It is not confined to one class, nor to cities or the country but is one universal movement which is reflected throughout all the industries of the United States.

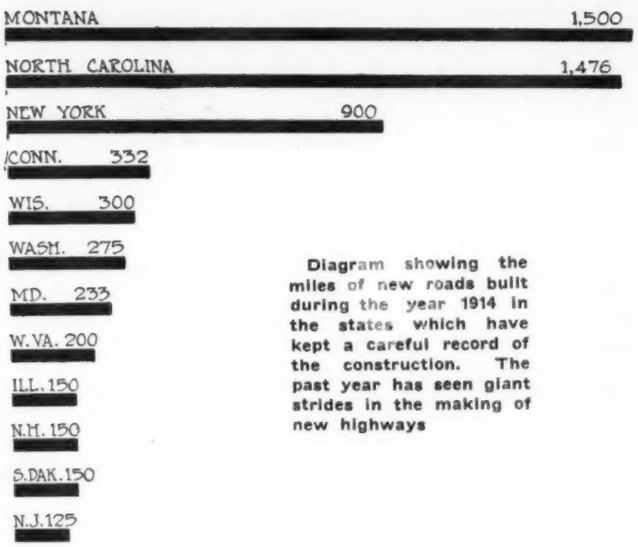


Diagram showing the miles of new roads built during the year 1914 in the states which have kept a careful record of the construction. The past year has seen giant strides in the making of new highways

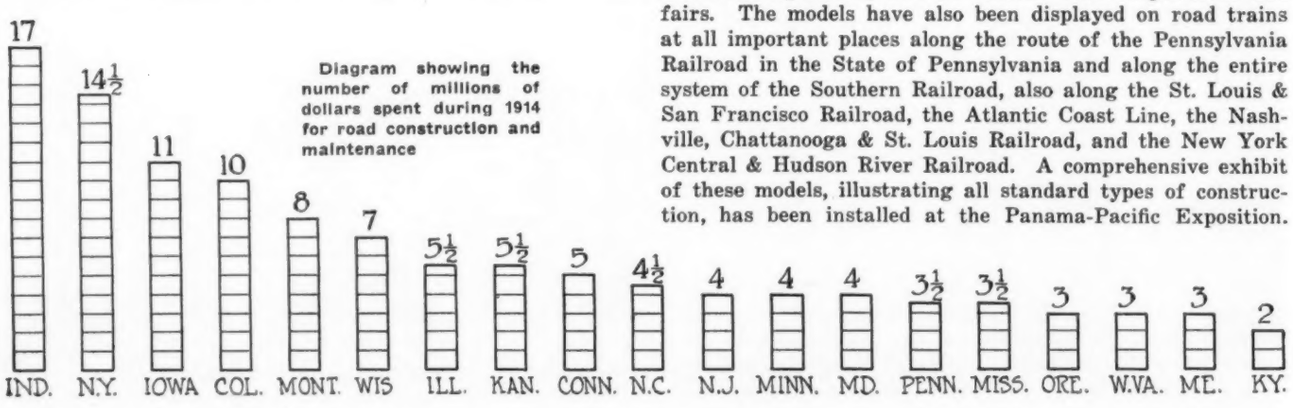


Diagram showing the number of millions of dollars spent during 1914 for road construction and maintenance

Road Models for the Public

The Office of Public Roads of the United States Department of Agriculture made an exhibit of road models for the first time in 1909 at the Alaska-Yukon-Pacific Exposition. The aim was to put on view such striking examples in miniature of model roads that visitors would not only appreciate the beneficent effects of improved roads but would, at the same time, be able to understand the methods of their construction.

Since the Alaska-Yukon-Pacific Exposition closed, the exhibit of the Office of Public Roads has been displayed at Omaha, Neb., during the National Corn Exposition; at Knoxville, Tenn., during the Southern Appalachian Exposition; at Chicago, Ill., during the National Land and Irrigation Exposition; at New York City during the Travel and Vacation Exposition and the Domestic Science Exposition; at Atlantic City, N. J., during the American Road Congress; at Lethbridge, Alberta, during the International Dry-Land Congress; at Buenos Aires, Argentina, during the International Agricultural Exposition; at Turin, Italy, during the International Exposition; and at various other expositions and fairs. The models have also been displayed on road trains at all important places along the route of the Pennsylvania Railroad in the State of Pennsylvania and along the entire system of the Southern Railroad, also along the St. Louis & San Francisco Railroad, the Atlantic Coast Line, the Nashville, Chattanooga & St. Louis Railroad, and the New York Central & Hudson River Railroad. A comprehensive exhibit of these models, illustrating all standard types of construction, has been installed at the Panama-Pacific Exposition.

American Cars in Red Cross Work

Day and Night Trips to Firing Line for Wounded

Fleet of automobile ambulances attached to field hospital at Montdidier

HOW Packard automobiles and American volunteers assisted in Red Cross work on the Allies' front is a thrilling story told by Curtis Goode, brother of the Paris manager of the Packard company. When the French armies took up their present position, after the Battle of the Marne, H. H. Harjes, of the banking firm of Morgan, Harjes & Co., secured from ex-minister of finance Klotz the use of a suitable building at Montdidier, and furnished it at his own expense as a field hospital. The Packard company supplied eight touring cars which were quickly transformed into ambulances and placed in the hands of volunteer drivers operating under the control of the French army. Curtis Goode was one of these drivers.

5-Mile Trip with Wounded

Although the Packards were directly attached to the Harjes hospital at Montdidier, they were at the call of the chief military doctor of the district, and had to take cases either to their own or other hospitals, as directed. From October to May the automobiles have been engaged in the task of making trips from the hospital to the firing line, the nearest point of which is only 5 miles away, and of bringing in the wounded. For 8 months the sound of guns has been so continuous that when a member of the hospital staff comes home on leave he finds the quiet of the city oppressive. Day and night, at irregular intervals, the call would come for ambulances to bring in wounded. Where road conditions allowed it, the ambulances went close behind the line of trenches, picked up the wounded men who had been carried out by their comrades, and hurried off with them to the hospital. By this rapid treatment thousands of lives have been saved and the men have been spared suffering inevitable with slower methods of transportation.

This portion of the front has undergone no change since the month of November. Both French and Germans are strongly entrenched, with a distance of only 100 yards between them. The position evidently is not of sufficient strategic importance to warrant the loss which would be sustained in a determined attack. Thus the men sit watching one another, and occasionally have the monotony relieved by heavy bombardments. Fortunately for the men, this kind of warfare is not very destructive. Curtis Goode relates that one evening the Germans began a bombardment on a serious scale. During the entire night big guns boomed as rapidly as if the huge shells were being fired from a machine gun. Occasionally a French gun joined in the welter of sound. Every window in the hospital trembled and rattled from 6 p. m. to 8 o'clock the next morning. The automobile staff was up early, expecting to have a busy day. The net result of the night's heavy firing was eight wounded cases.

A Trip to the Trenches

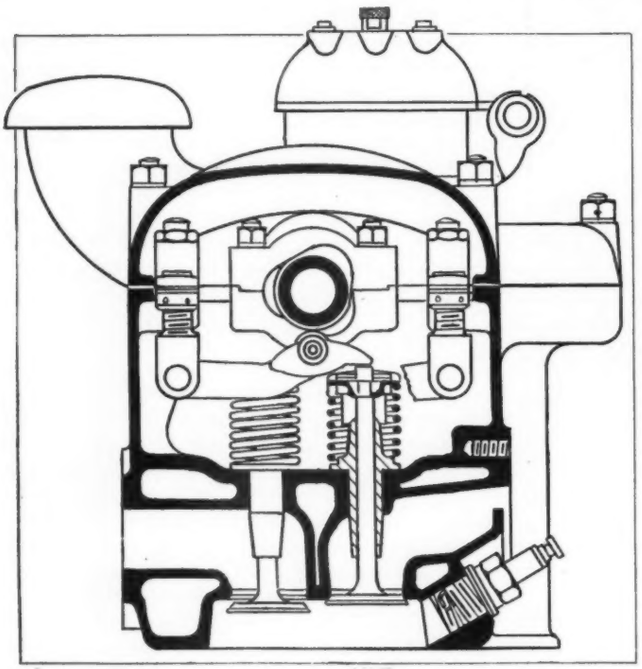
One of the experiences of which Curtis Goode has the most lasting remembrance is a trip he was allowed to make one night into the front line trench held by the French. "We set out from the hospital in a car," he stated, "and for the last 2 miles had to drive in complete darkness, for even a side light would have been observed by the enemy. At an indicated point we left the car in a farm building and proceeded ahead on foot. At this point there is a main communication trench 2 1-2 miles long leading right up to the French front line trench, but having branches off it to other trenches. During the daytime this main communication trench has to be used throughout its entire length.

"In this district numerous shells have exploded on the roads, but they have not made traveling impossible. On the main highways the surface is so hard that the shells do not penetrate and the damage done is annoying only at night if running without lights. On the lower class roads, with little more than a dirt surface, greater damage is inflicted and it is sometimes impossible to pass until soldiers have filled in the holes."

Packard ambulance halted by French sentry on a trip to the firing line for wounded

Chalmers Valve-in-Head Motor

To Be Principal 1916 Product—Good Acceleration and High Gear Ability—Rear Axle Gearset



Section through Chalmers valve gear showing rocker arms and tappet adjustment

FEW of the new cars appearing at the New York show last January attracted more attention by virtue of their design than did the new Chalmers with valve-in-head motor, on account of the remarkably clean outline of the engine and the chassis as well. Naturally with so much novelty of construction as was present in the motor, the performance of the cars on the road has been watched with interest, but the fact that the manufacturer is continuing the same chassis practically unchanged is the best proof that the new motor has worked out very well.

The Chalmers Motor Co. has three cars for 1916, and of these the 6-40 is the principal product. The 6-48 and the Master six are continued, but it is not anticipated that there will be so large a demand for these as for the smaller car.

Of the 6-40 there are two types, five-passenger and seven-passenger, the latter having 4 in. more wheelbase and semi-elliptic rear springs instead of cantilevers as used on the five-passenger. These two models are priced $1,275 and $1,350 respectively. The 6-48 which has a T-head motor and some other small differences in design costs $1,550 with a seven-passenger body, and the Master six, $2,175 with touring body.

For fitting to the 6-40 a new body is being developed which is either a standard open touring affair or a sedan, and the attachment of the upper works is made in a highly ingenious and secure manner. Whether the car is open or closed there is nothing to show that it is convertible and in the closed condition the appearance is handsome. This new body is not yet in production, but will be available later on.

Camshaft Driven Centrally

Coming back to the 6-40 chassis the unique feature of the motor is that the overhead camshaft is driven at its center by a large worm gear and to obtain a similar drive at the center of the crankshaft the middle bearing is divided into halves. This makes a four-bearing shaft and it is remarkable that it has been possible to get the middle bearings of such good width. Having a bore of 3.125 in. and stroke 5 in. the motor is intended for high speeds. Crankshaft rigidity has been obtained by using a 2.25-in. shaft and rigidity of crankcase by very rigid web work around the center bearing supports, and the use of a box form of crankcase with sides that come much lower than usual. This type of case is not uncommon where the bearings are put in endwise being first mounted on the shaft, but it requires considerable ingenuity to arrange them as in the Chalmers so that they can be scraped in with the shaft in its proper place. The detail of the design can be observed in the section of the motor on the opposite page.

The cylinder block consists of three portions, the lower in which the pistons work is as simple a casting as could well be made. On this rests the head casting which carries the camshaft, the valves and the spark plugs, while on top of all is an aluminum cover.

Compound Lubrication

Two features of great convenience to the driver are the positions of the ignition distributer and the oil filler, since both these parts are above the top cover, as can be seen in the photographic reproductions. Oil is poured into the camshaft case where some small part of it remains, and the overflow passes down the space surrounding the camshaft drive shaft to the base.

With an overhead-valve motor and an overhead camshaft also lubrication is liable to be troublesome, because enough oil must be pumped to the top and yet the supply to the camshaft kept down sufficiently to prevent flooding the valves. In the Chalmers the camshaft is hollow and a small hole is drilled through each cam, at the center there is a supply for the skew gear and, of course, holes for the supply to each bearing. Oil is pumped to the front end bearing direct, and thence passes along the shaft, but the size of the outlets prevents too much lubricant reaching the valve compartment.

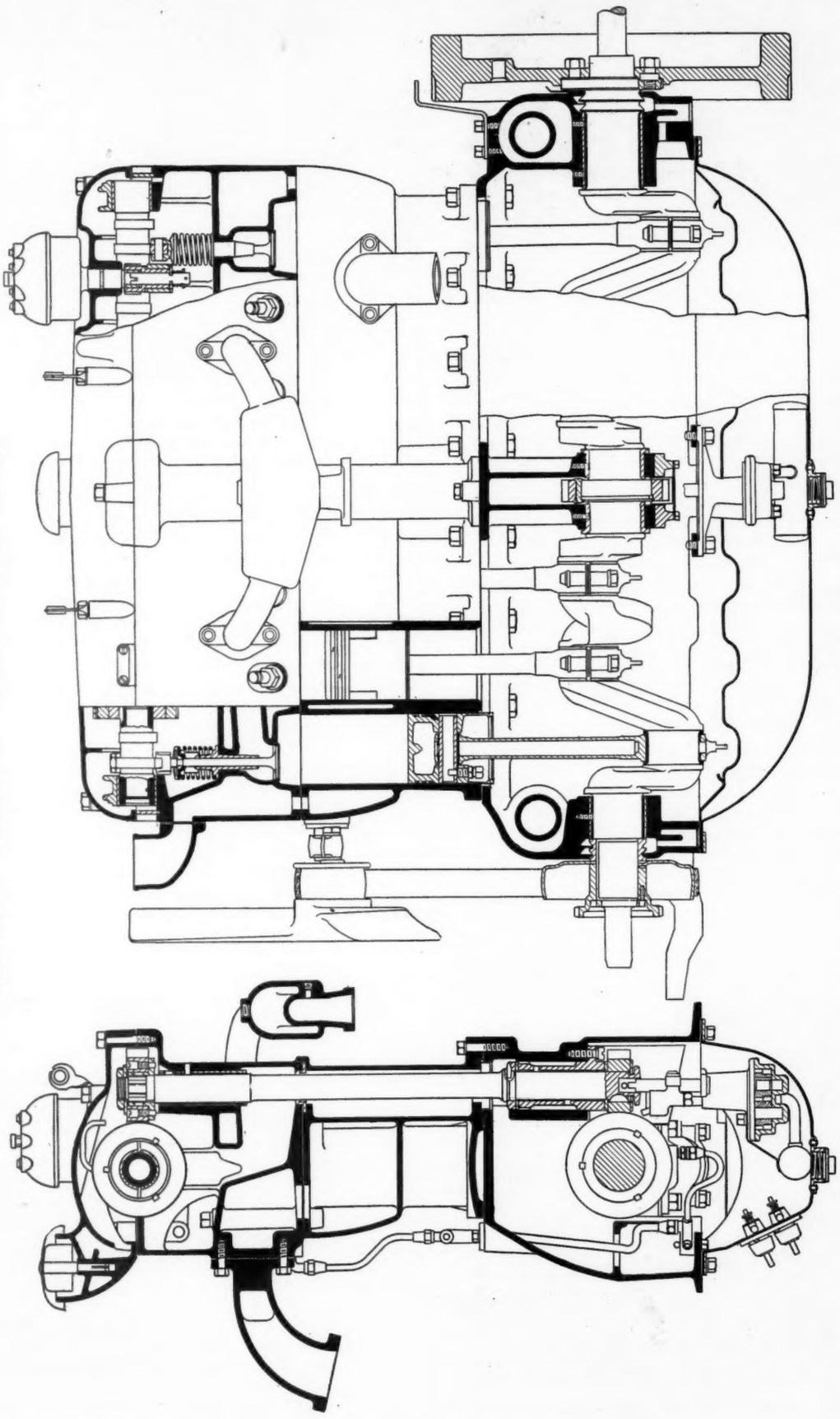
Sundry gutters serve to catch what little drip there is and to conduct the oil back to the shaft tunnel whence it returns to the crankcase. For the crankshaft there is a supply to each main bearing, all the oil leads being copper pipes, and dip troughs are used for lubricating the connecting-rod bearings. Splash cares for the pistons in the usual way.

The same vertical shaft which drives the cams is used for the oil pump drive, as the pump is mounted directly beneath it and connected by a short, jointed shaft that allows the pump to be taken off for cleaning without disturbing other parts.

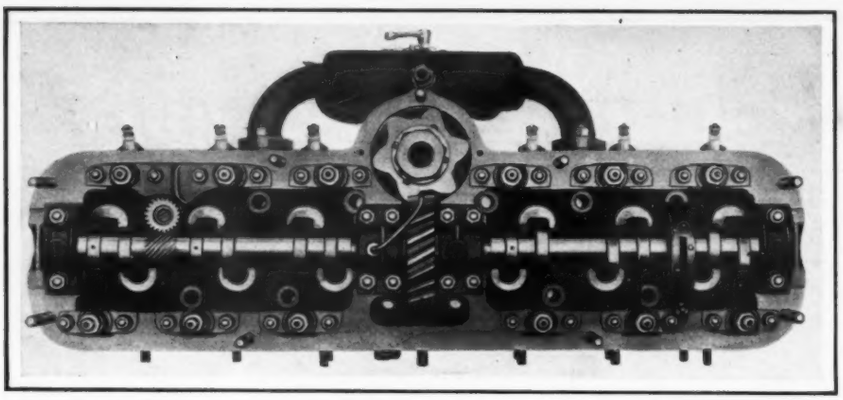
Accessories Disposed Neatly

Having all the valve gear on top of the motor means that the generator and starting motor can be put in any convenient place alongside, without interference with other parts. Thus, instead of the starting motor being low down and almost in the mud pan as it sometimes has to be, it is carried high on a bracket on the crankcase side. There are several bearings and joints in the mechanism which slide the pinion into mesh with the flywheel rim gear, and the high

The New Chalmers Valve-in-Head Motor



Chalmers 6-40 valve-in-head motor which is 3.125 by 5 in. Observe the large camshaft driving gears and the arrangement of the oil pump at the foot of the vertical shaft. The easy intake and outflow for the gas can be appreciated from this view. Note also the construction of the crankcase which is designed to give extreme rigidity



View of Chalmers valve mechanism as it appears when the aluminum top cover is removed

placing of the motor makes these points very easy of access.

A very simple and yet completely effective means for adjusting the generator drive chain is employed, this being made possible by the method of support for the motor. In the crankcase are two large holes, one at each end, extending transversely clear through the aluminum, and steel tubes are put through these holes to form the crankcase arms.

The Gray & Davis generator is hung just beneath the right hand end of the front tube, where it is sufficiently accessible for all purposes, and the bracket which holds it is gripped to the crankcase supporting tube by a clamp screw. The drive chain is outside the crankcase, as can be seen in the photograph, so, by slacking the clamp screw and gently tapping the bracket along the tube the chain can be brought to any desired tension and held there by a turn of the clamp. The whole operation of adjustment can be performed very easily and quickly.

Careful Balance a Feature

It is well known that the main trouble in the way of producing a successful high speed six is the vibrations which arise in the crankshaft. To eliminate these is partly a matter of design and partly one of manufacture. From the drawings can be seen the way in which design affects the Chalmers motor, for not only is 2.25 in. very large for a 3.125 bore motor, but the crank webs are also very substantial. The box form crankcase must help a good deal and no doubt the divided middle bearing is, from the rigidity viewpoint, the equivalent of a bearing the full 4 in. long.

In the factory processes there are two balancing operations, one for the flywheel and the other for the crankshaft, the parts being run on a special machine designed by the Chalmers engineers and developed from a couple of known tools into a much simpler form. The operation consists of running the parts in one direction only and balancing by drilling the flywheel rim or the crankpin.

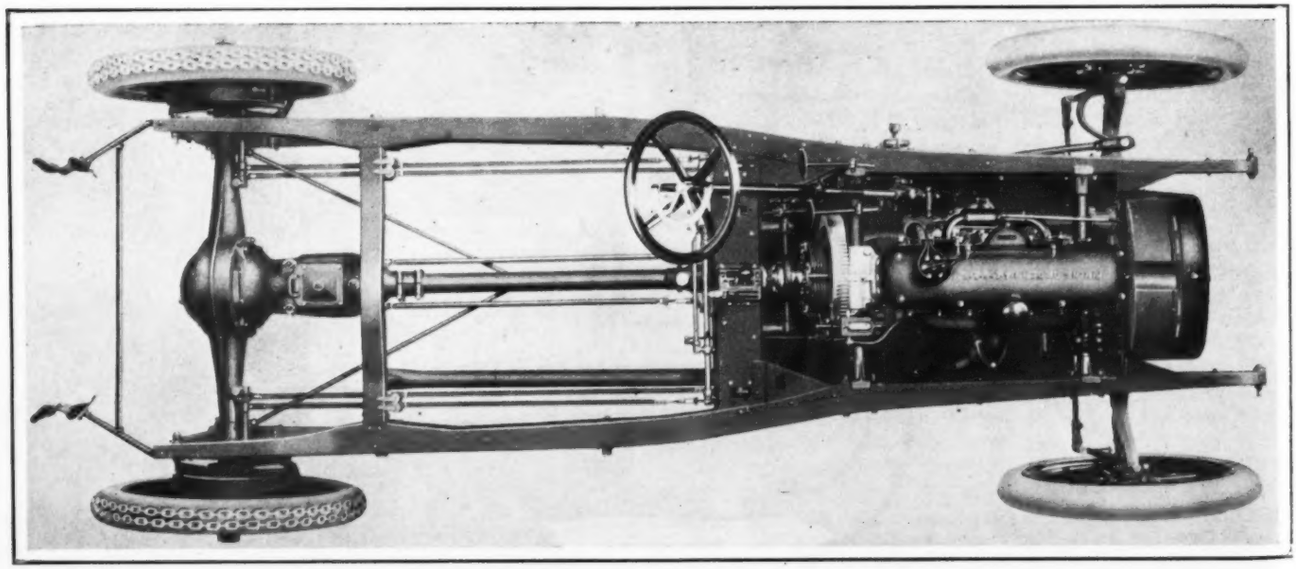
This method of handling the crank is made possible by the absence of internal oilways in the shaft, as frequently a quite large amount of metal has to be drilled out. Skill and experience of the workman count for almost everything in this operation as a practiced man can judge in a moment where it is that the shaft is heavy and to get smooth running at 1500 to 2000 r.p.m. very little inaccuracy is permissible. The crank webs are not machined externally, of course, as this would be of but little use. It is said that shafts and flywheels balanced on the special machines which Chalmers uses are always in static balance when their running balance has been corrected, which is not always the case with some other methods.

Tubular Connecting-Rods

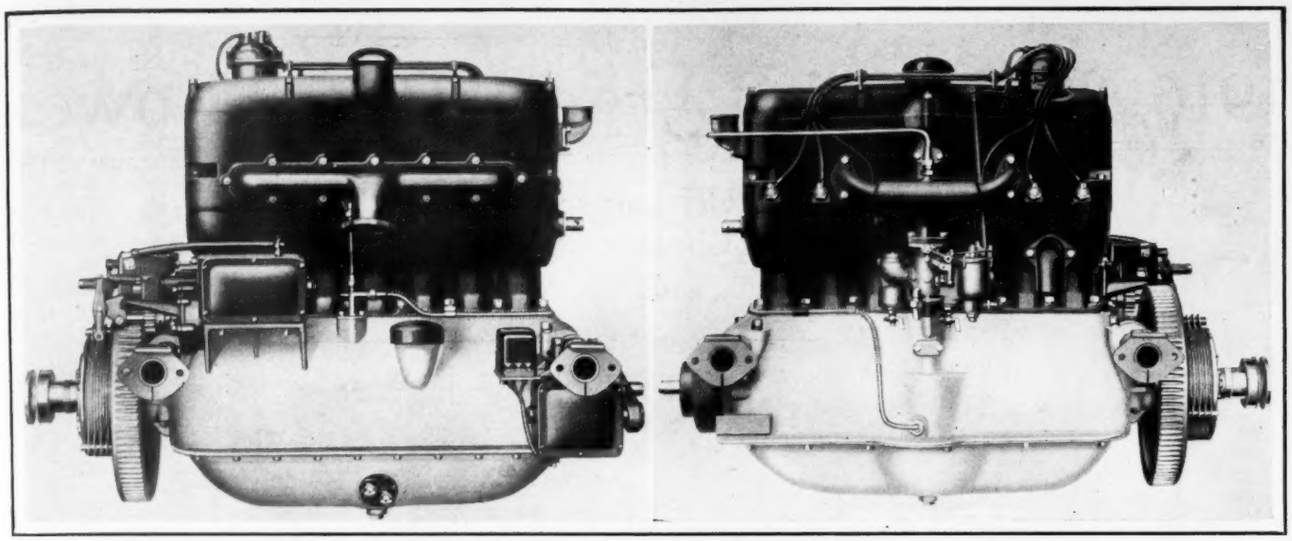
Another small detail that is of interest is that the round-section, hollow connecting-rods have small holes drilled through them near the bottom, this being to allow the escape of any oil which might find its way inside. As the rod is drilled right through the hole at the upper end is closed only by the piston pin bushing, and it is possible for oil to slowly work its way past this bush and so gradually fill up the rod. If this happened to one rod and not to the others the balance of the motor would be interfered with seriously.

Lightweight Axle Gearset

Back of the motor is a simple form of dry-plate clutch with a light action and a very decided grip, and then comes the short double universal to which the front end of the drive shaft attaches. Chalmers pins its faith to the rear axle gearset so that the chassis divides into but three main assemblies, the motor, the gearbox and the frame with springs and front axle. To cut the unsprung weight a carefully designed aluminum gearbox is used and another point which should



In this plan of the Chalmers 6-40 chassis notice that the springs are all under the frame and observe the direct brake connections. These latter are strips of thin spring steel which cannot rattle



Left—Exhaust side of Chalmers motor, showing Gray & Davis generator and starting motor. The cap on the crankcase side is a breather only as the oil is all put in through the top cap. Notice the accessibility of the Atwater Kent distributer. Right—Intake side of Chalmers motor. Observe the fins on the oil supply pipe which cool the lubricant on its way to the bearings

be mentioned is that the gearshifting rods are laid out on such centers that rough roads and high speed combined, have no tendency to throw the gearshift lever to and fro. This is a fault to which some rear-axle-gearset cars have been somewhat prone and to eliminate it is not quite so simple as might appear.

It is not easy to describe a car like the Chalmers, which is designed and made in its own factory and does not depend on assembly parts, without running to great length, so, having considered the main units of the chassis, the others may be hastened over a little. First, the brakes are 14 by 2 in. and 14.375 by 2.25; all rods and links are arranged to have a straight pull and the levers are well proportioned, so that plenty of arresting power is available without heavy pedal pressure. Again, special pains are taken to make the steering free and precise, this being a matter of large thrust bearings and a proper setting of the front axle swivel pins.

In the side view of the chassis the substantial support toward the middle of the cantilever spring can be seen, also the long shackle which permits very free action at the front. Putting the middle spring support *under* the frame instead of alongside it removes all twisting stresses on the side rail and saves weight in the brackets and attachments. In practice the springs behave in a most exemplary manner giving easy riding over the worst possible dirt roads and yet the rear springs are free from roll.

Car Performance

In a short demonstration run over a particularly vile piece of sand road near the Chalmers factory it could be noticed that there was very little tendency for the car to plunge, even with the rear seats unoccupied, and incidentally the same run showed the ability of the motor to pull smoothly on high gear through fairly heavy going. Naturally, one would expect plenty of high-gear ability with a 5.25 to 1 ratio, but a good deal of vibration round about 30 m.p.h. would also be anticipated and this most certainly does not occur even at speeds a good deal above this. The Rayfield carbureter suits the motor well and provides a very good acceleration, a couple of trials on a brick road showing from 5 to 30 m.p.h. on high gear in between 14 and 15 sec.

The touring bodies have an almost straight-line side and the high hood makes the car look powerful. Ample leg room and upholstery deep enough to give the soft feeling of a good arm chair, combined with careful finish, are the principal characteristics. Equipment is complete and includes a particularly handy rain vision windshield. Tires are 34 by 4 in. all around and there is one spare demountable rim. There is no need to mention everything in the smaller detail save to remark that it is in proper keeping with the character of the chassis.

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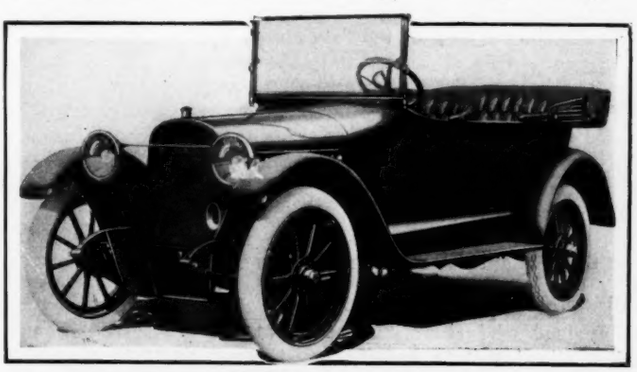
New Washington Law Is Sensible

TACOMA, WASH., July 17—It is the opinion of the automobile dealers of the State of Washington that the new motor vehicle code is being administered in a common sense manner by State officials and particularly by the Secretary of State.

Dealers in motor vehicles have given the law considerable study during the past thirty days, and have seen a great many things that would cause the motor car people generally a great deal of trouble if carried out literally.

One of the things which has been of especial interest is the matter of having licenses on new cars that are being taken from the freight sheds or distributing points to the dealer's place of business. In cases where dealers want to move several cars at one time, it would work a considerable hardship on them to have each car equipped with number tags, as it would mean the buying of several additional licenses that would not be needed except on these occasions.

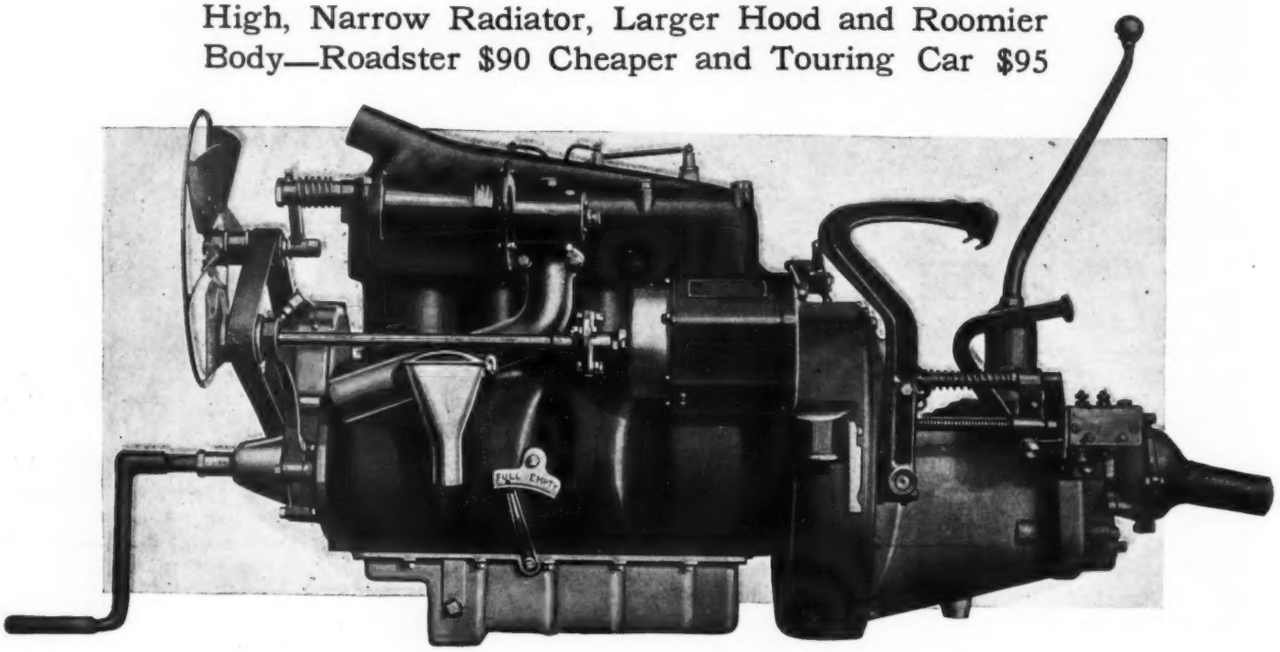
Secretary of State I. M. Howell, has advised that in his judgment it is not the intention of the law to require all cars to be tagged with State numbers when they are operated in such a manner if they are kept all together and the front and last car carries license tags in the regular way.



Chalmers 6-40 five-passenger car for 1916 which sells at $1,275

1916 Maxwell Larger—Price Lower

High, Narrow Radiator, Larger Hood and Roomier Body—Roadster $90 Cheaper and Touring Car $95



Left side of Maxwell four-cylinder block power plant for 1916. Note new oil gage and also fan drive

A BIGGER, better-appearing car at a reduced price is the offering of the Maxwell Motor Co. for 1916. The fitting of a high, narrow radiator, a larger hood, a more roomy body and the incorporation of a number of detail refinements in chassis and in comfort particulars have increased the value of the car to the purchaser while at the same time the Maxwell company has made a price cut of $90 on the roadster and $95 on the touring car. For 1916 the Maxwell touring car is $655, the roadster is $635.

While built upon the same chassis of 103-in. wheelbase, the new Maxwells appear larger than their immediate predecessors. The higher radiator, the changed body lines, and the rounding of the bodies into fuller lines, have produced this effect. The hood has been raised and the body where it meets the hood has been rounded out.

While the size of the motor has not been altered, greater port area has resulted in an increased power. Other changes in the unit power plant construction include the complete inclosing of the clutch and flywheel instead of the former construction whereby there was a yoke passing around the open flywheel and supporting the gearset. An entirely new feature is the running of the cone clutch in oil. The housing is designed to be oil tight, and thus the clutch is constantly bathed in the lubricant, which cushions its engagement.

In the Maxwell design of clutch, a woven asbestos fabric is used as a facing for the cone, thus the oil does not harm it in any way. It is probable that leather could not be used with an oil bath of this kind. A slightly heavier adjustable clutch spring is used with the new oil-bath construction. The cone is now made of cast aluminum instead of pressed steel, so that the unit is really lighter than before.

Oiling More Positive

Instead of introducing the oil at the front trough, and then allowing it to find its way through ducts to the other troughs, the new method is to introduce oil into each trough individually, making a more positive arrangement. A supply pipe runs along the inside of the crankcase and there is a lead to each trough. Along with this change a new aluminum base is now fitted which replaces the former pressed steel base and acts as the reservoir. An oil gage on the side of the crankcase is another new fitting. It operates by having a float-controlled pointer indicate the level. Another refinement is the fitting of a combination breather and oil filler on the left side. Although this breathes downward, the filling is from the top, and hence any oil that might be thrown out from the crankcase is sent to the drip pan instead of spraying over the engine.

The engine is of the detachable-head type, and this year an improved form of head is fitted. It is split higher up, and carries the water outlet connection as an integral part.

Power Plant Features

Reviewing the general features of the Maxwell power plant, the engine retains its bore of 3⅝ in. with stroke of 4½ in., and it has a S. A. E. rating of 21.1 hp. The dimensions give a displacement of 185.8 cu. in., and the stroke-bore ratio is 1.24.

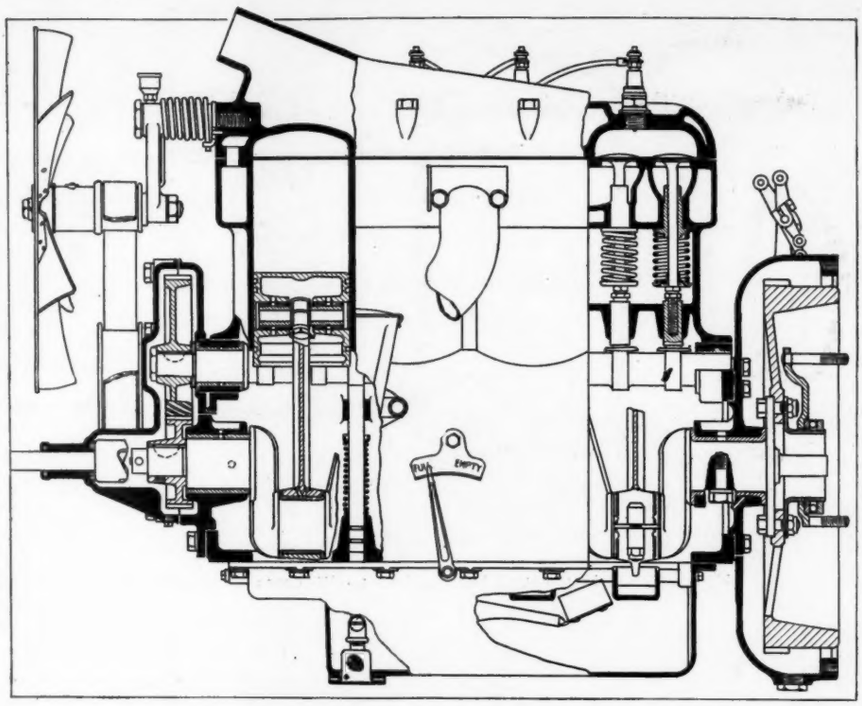
Cylinders and the upper part of the crankcase are integral, making for a rigid construction. Valves and manifolding are on the right, as is also the Simms high-tension magneto. The two-bearing crankshaft is exceptionally large. Two bearings support the camshaft also, and the front gears are spiral bevels.

Principal Motor Dimensions

The bearing sizes and valve dimensions follow:

Front main bearing: 1⅞ by 2½ inches.
Rear main bearing: 1⅞ by 2 13-16 inches.
Connecting-rod lower bearing: 1⅞ by 1½ inch.
Camshaft front bearing: 1¼ by 1 13-16 inch.
Camshaft rear bearing: 1¼ by 1⅜ inch.
Valve diameter: 1 9-16 inch.

The Simms-Huff motor-generator unit is carried on the rear of the engine, and the one new feature is in the complete housing of the gearing which connects with the flywheel for starting. Driven as a generator, the unit is run by a shaft, but as a motor, it gears with flywheel teeth. Operating on a 12-volt current, the motor turns an average engine at about 100 r.p.m., although this will vary with the weather. Drive for the generator shaft is by a belt, which passes over three pulleys. The driving pulley is placed on the outward extension of the magneto shaft, and it passes over the fan pulley as well as the generator shaft pulley. Tension is kept constant in the belt by a spiral spring attached to the arm which carries the fan and its shaft and pulley. This bracket is carried by the cylinder head, and the spring holds the pulley up against the belt with sufficient force to maintain a good drive for both fan and generator with little or no slip. It makes a practically noiseless assembly.



Part section through Maxwell four-cylinder block motor for 1916

There is a commendable refinement in connecting the wires on the body with those on the chassis by a junction plug beneath the front compartment floorboards. The storage battery is hung amidships of the frame on two cross members. A diagrammatic illustration of the new system appears on page 150. It greatly facilitates removal of the body from the chassis.

Clutch and gearbox assembly on the new Maxwell. The clutch and flywheel are inclosed for 1916

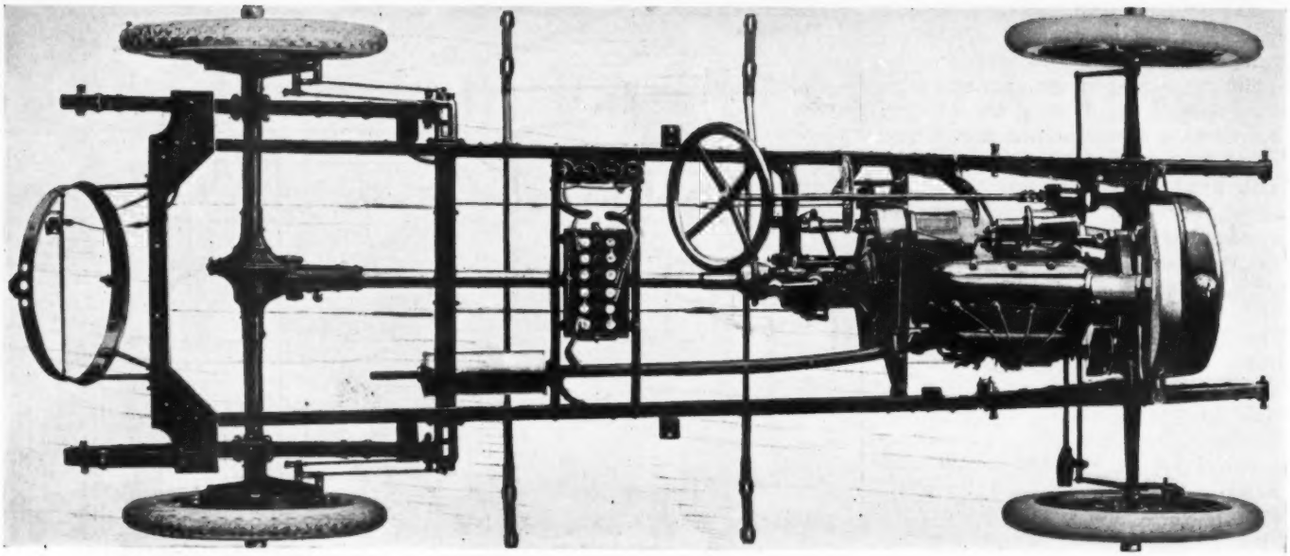
There is no change in the drive system. The driveshaft is inclosed within a torsion tube and there is a universal at the front end just back of the three-speed gearbox. The shaft connects compactly to the three-quarter floating rear axle which incorporates five Hyatt spiral roller bearings in its construction. There is one bearing under each wheel, one carrying the pinion and one on either side of the differential unit. Ball thrust bearings are used in conjunction with the Hyatts in the latter three positions. The axle shafts are of nickel steel, and are housed in tubes of seamless steel which rivet to the malleable iron differential housing. An axle ratio of 3⅝ to 1 is used.

Springing is continued as in 1915, with three-quarter elliptic rear springs 40 in. in length, and front springs 32 in. The rear pair is fixed at the front to transmit the drive, and attaches to the axle on a rocking seat, giving unrestricted action.

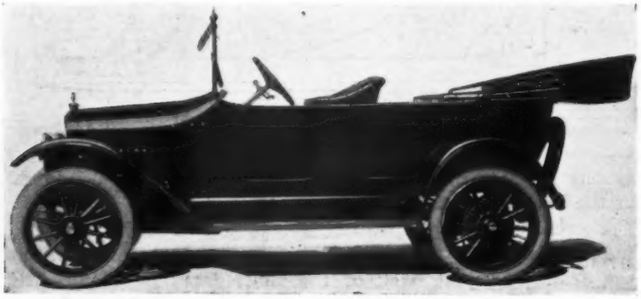
By tapering the frame, it gives good support to the body along the entire length, the rear width being 33 7/16 in. as compared with 28 in. at the front. There are three cross members, the rear forming a mounting for the upper end of the springs, while the tire carrier is also attached to it.

Tires are 30 by 3½ with non-skids in rear. A new feature on the 1916 cars is the use of demountable rims instead of the straight clincher type.

Aluminum-covered running boards are used instead of corrugated metal. On the floor of the front compartment,



1916 Maxwell chassis, showing tapered frame with cross member for tire carrier and giving an idea of the new radiator



The 1916 Maxwell touring car which sells for $655

linoleum is also used in place of the former rubber matting. Non-rustable metal edging is used to hold down the edges of the new covering for these parts, making a very neat job.

More rigid supporting of the headlights is secured by bracketing them to the fenders instead of by vertical supports from the frame. A noticeable change is the fitting of a well-arranged instrument board with speedometer and gages set flush with its surface in contrast with the former portruding attachment. The electrical connections are all brought to one unit which is removable so as to readily reach the terminals. In the center of this unit there is a plate held by a spring. This exposes the fuses, making it very convenient to replace them.

Body Longer and Wider

The body is widened and lengthened so that more leg room is provided as well as 3 in. greater width in the seats. There is 29 in. leg space in the front and 28 in the rear of the touring model. Pockets have been put in all four doors, which are considerably wider. Accelerator and starter pedals have been farther separated.

Points that do their part in adding to appearance are the louvres in the hood, the improved two-piece windshield which has substantial side supports to carry the front of the one-man top—also a new feature—and the domed fenders which are made unusually strong.

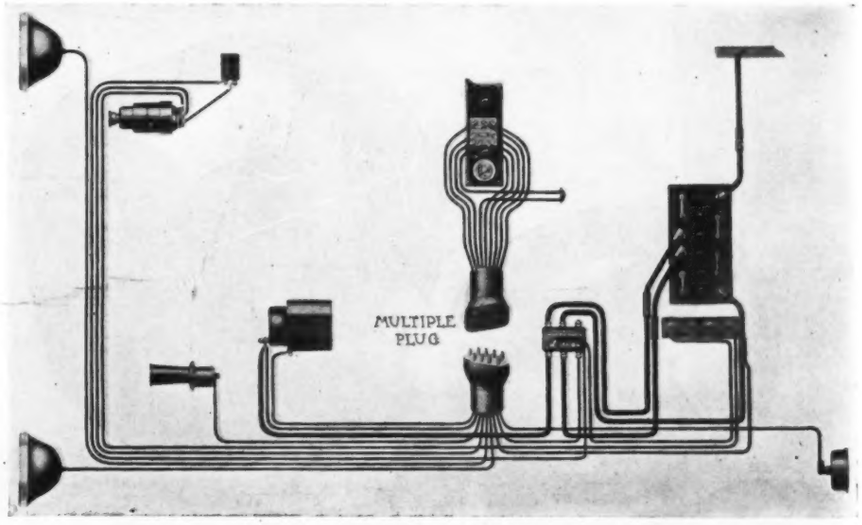
The gasoline tank has been somewhat enlarged so as to hold 10 gal. A conveniently-located sediment cup on the right under the hood strains the fuel going to the carbureter and is fitted with a shut-off cock.

In addition to the open body models already mentioned, Maxwell offers a five-passenger permanent-top convertible-body type at $935, a six-passenger town car at $915, and a two-passenger cabriolet at $865. The first-mentioned is fitted with sash in the sides which may be slipped down into compartments in the body when desired, leaving all open with only the top permanent.

Regulate Truck Size in Ohio

CLEVELAND, OHIO, July 18—The weight and speed of motor trucks are to play an important part in the new laws now being enforced on city streets and county roads. The weight limit on any stone, brick or macadamized road is 3,400 lb., with vehicles having a tire less than 3 in. wide.

Vehicles with a greater total weight will not be allowed to travel over county roads without permission from the board of county commissioners. Vehicles or contrivances having flanges or lugs are prohibited.



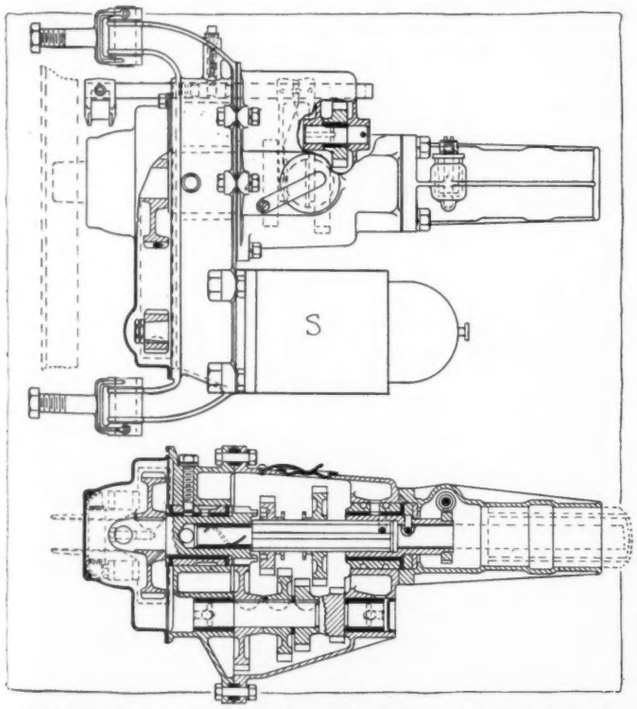
New Maxwell wiring system permitting easy removal of body from the chassis

Briscoe Eight and Four in Same Chassis

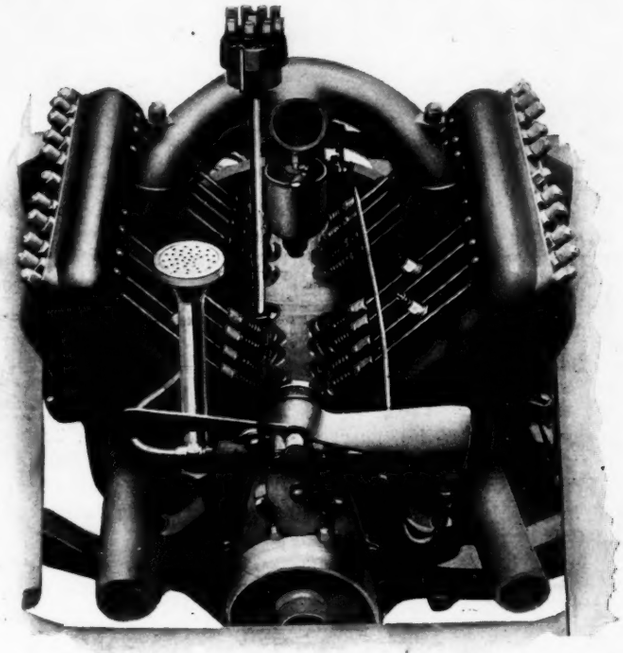
Eight Is Ferro 3 by 3 1-2 and Four a New Briscoe Design 3 7-16 by 5 1-8—Gearset Reconstructed To Render Motors Interchangeable—New Rear Suspension by Cantilevers—Two Headlights for 1916

THE 1916 season will, with a few companies, be the proving out as to the desirability of fitting two different motors on the same chassis, the chassis design being such as to make this possible at a nominal increase covering a larger motor. As announced in these columns some weeks ago, the Briscoe Motor Co., Jackson, Mich., has such a program and is prepared to furnish either a four-cylinder or eight-cylinder motor in the same chassis, giving a buyer the option of using the four-cylinder motor for thirty days and if at that time he decides on an eight he can secure the same at $200 additional, the Briscoe company taking back the four-cylinder motor and installing the eight. The four-cylinder motor is a brand new design and the eight-cylinder motor is built by the Ferro Machine and Foundry Co., Cleveland, Ohio, and characterized by having valves in the head and having the eight cylinders and upper half of the crankcase formed in one casting. This motor was exhibited during the recent New York show and has been undergoing development ever since. The four-cylinder motor which the Briscoe company fits is 3 7/16 by 5⅛. It is claimed to give 38 hp. at 1700 r.p.m. It is an L-head block design with detachable cylinder head and valve stems and springs inclosed.

The eight-cylinder motor is a conventional V-type design with cylinders 3 by 3½ giving a piston displacement of 198 cu. in. as compared with 190.4 cu. in. on the four-cylinder. This motor, like the four, has detachable cylinder heads.



The new gearbox on the Briscoe 1916 chassis, replacing the unit-with-motor construction, due to the necessity for interchangeability of the eight and four-cylinder motors in the same chassis. S is the motor-generator



The valve-in-the-head Ferro motor used in the 1916 Briscoe eight-cylinder model. This engine has a bore of 3 and a stroke of 3½ in., giving a piston displacement of 198 cu. in.

Owing to offering either eight- or four-cylinder motors in the same chassis, the Briscoe company has now mounted the gearset as a separate unit in the middle of the chassis whereas formerly it has been in unit with the motor. The substitution of one motor for the other is hence a matter of connecting the shaft between the clutch and the gearset insofar as the driving elements are concerned.

Two Headlights Instead of One

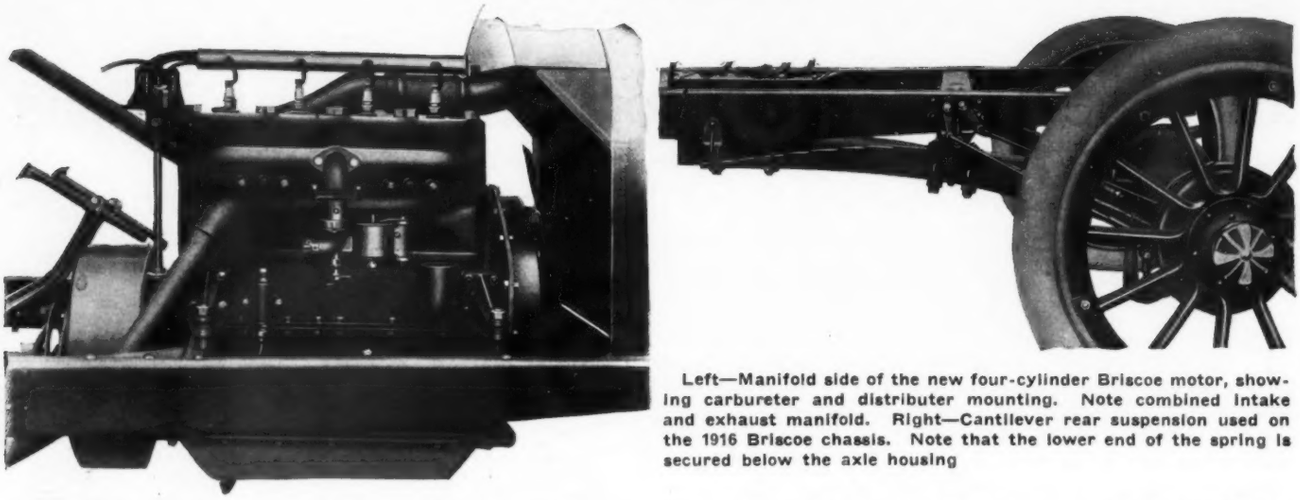
Externally, the 1916 Briscoe car is quite different from the 1915 model chiefly in that two headlights are used in place of the single light incorporated in the radiator, which scarcely met the requirements of certain states where two lamps are compulsory equipment.

Domed fenders add to the general appearance, and they have been more rigidly fastened, by attaching them directly to the body in place of the previously used method of mounting them by brackets to the frame. Obviously there is less chance for rattle and wabbling by this method of construction.

The four-cylinder machine is so radically different from that of last season that it may rightfully be called a new job throughout. The scheme is to furnish either engine the customer desires, charging $750 for the car with the four and $950 with the eight.

New Cantilever Suspension

The new body gives 3 in. more leg room in the rear, and a new rear suspension supersedes the semi-elliptic design of 1915 models. It is of a nice cantilever type, and makes an exceedingly easy riding car. The wheelbase has come in for



Left—Manifold side of the new four-cylinder Briscoe motor, showing carbureter and distributer mounting. Note combined intake and exhaust manifold. Right—Cantilever rear suspension used on the 1916 Briscoe chassis. Note that the lower end of the spring is secured below the axle housing

a 7-in. increase to 114 in., and along with the general enlargement of the car, tires have been increased from 30 by 3½ to 32 by 3½ size. Control pedals are now adjustable; and the double internal expanding brakes have been replaced by the more usual internal expanding emergency and external contracting service sets.

Summed up, the new Briscoe four is a larger and more powerful car than the 1915 model, so that it is more value for the money. The motor is an entirely new design with a bore of 3 7/16 in., as compared with the 3⅛-in. bore of the previous engine. The stroke is the same—5⅛ in. Another important difference is the separation of gearset and engine, the former now being located amidships in contrast to the former unit power plant construction.

The eight-cylinder Ferro engine adheres very closely to the design as brought out the early part of this year. The valves are overhead, with rods running up from the single camshaft in the center of the V. Cylinders have a bore of 3 in., and a stroke of 3½ in., giving a piston displacement of 198 cu. in.

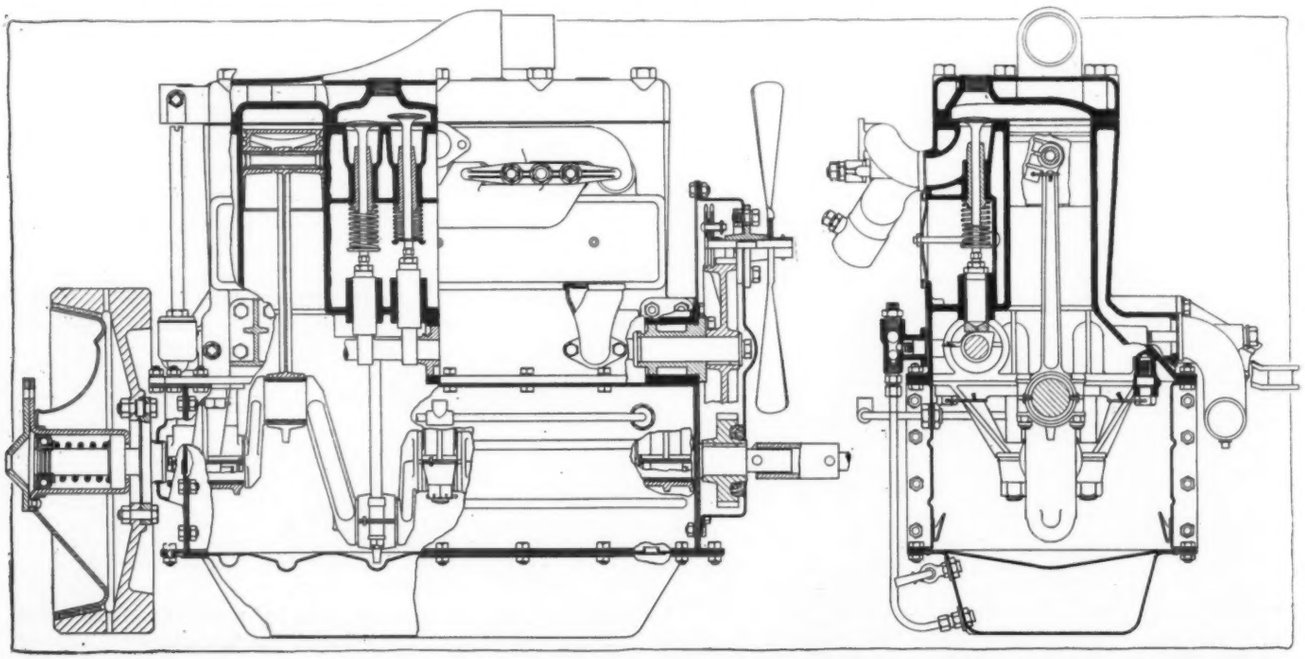
In this engine, the two blocks of four cylinders are set at the usual 90 deg., and the upper half of the crankcase is made integral with the cylinders. Thus, their eight cylinders and upper case are cast as one piece, and greater rigidity is claimed for the design.

Single Camshaft Used

Sixteen cams are used on the single camshaft, mounted at the center of the V, giving a cam for each valve and making possible a simple duplicate four-cylinder timing. That is, No. 1 cylinder on the right is followed by No. 1 left, and so on. There is also another special feature of the engine, namely, the use of hot-pressed steel rocker arms for operating the valves. These are so pivoted in the top of the cylinder heads on ball joints that adjustment is made through the use of knurled nuts protruding through the top of the cylinders. Thus, in order to take up any play between valve rod and rocker, it is a simple matter to loosen the lock nut and turn the knurled adjustment screw until the proper clearance is obtained, the location of these being very convenient on the top of the cylinder blocks.

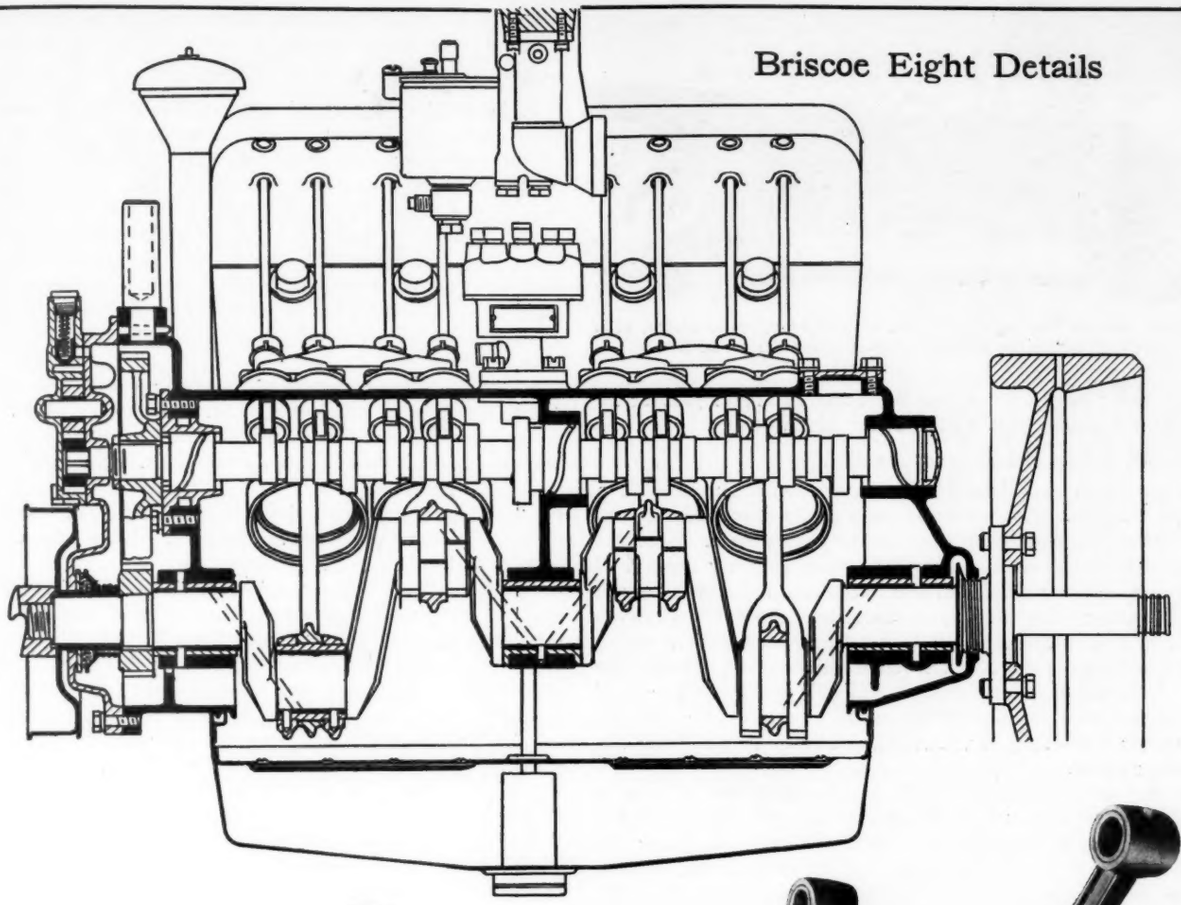
Cylinder Heads Detachable

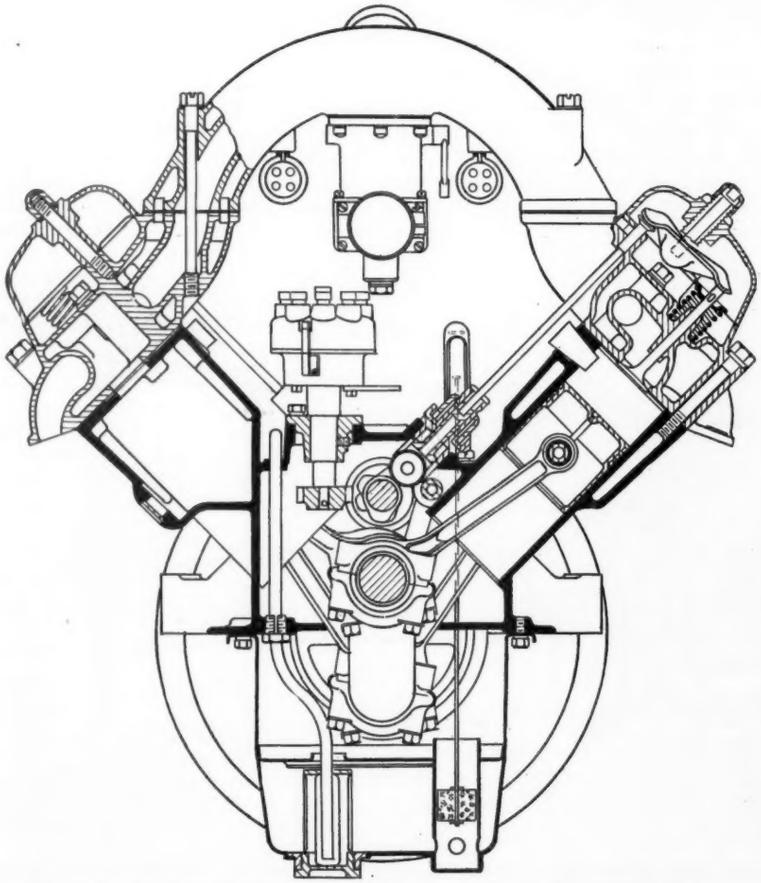
The cylinder heads are detachable, their removal giving access to the pistons. These heads carry all the valve mechanism, the water outlet connections and everything at the top part of the cylinders with the exception of the spark plugs

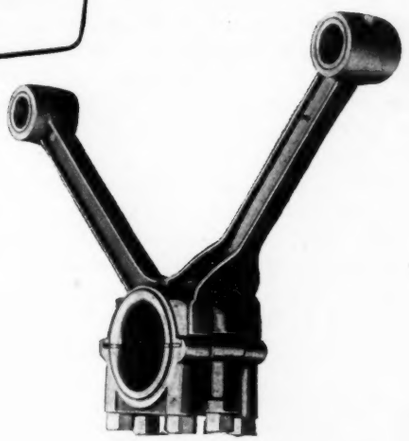


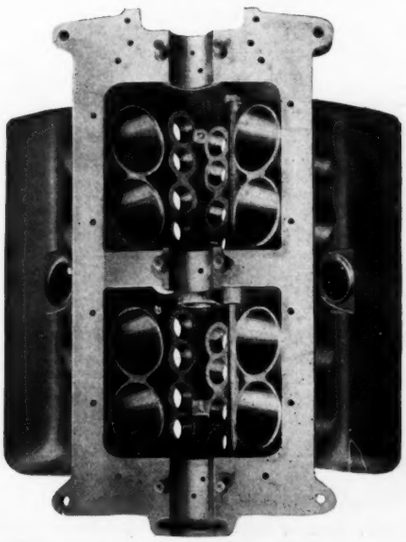
Longitudinal and transverse sections through the new four-cylinder Briscoe motor which has combined intake and exhaust manifolds, detachable cylinder heads, etc.

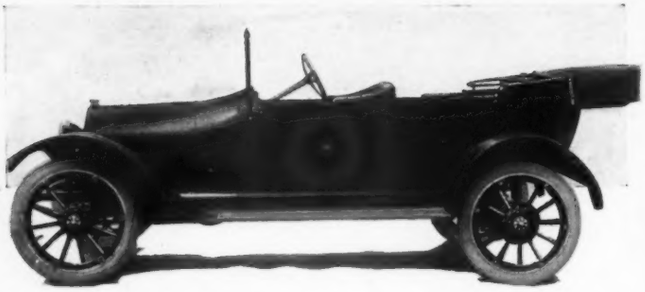
Briscoe Eight Details











The 1916 Briscoe touring car, which, with eight-cylinder motor, sells for $950 and with the new four-cylinder design at $750

which are placed in the V-side of the cylinders just below the joint between head and cylinder block.

Combined Intake and Exhaust Manifold

A combined fuel intake and water outlet manifold is a unique feature. The water passage really surrounds the inner fuel pipe, and the connection to the radiator is at the front side of the cross double-duty manifold. By the use of such a concentric manifold, the hot water circulates around the incoming fuel, aiding vaporization. As thermo-syphon cooling is employed, this outlet water construction works very nicely, since there is a considerable distance between the top of the combustion chamber, which is the hottest part of the engine, and the top of the radiator, due to the V form. This adds materially to the rapidity of movement of the circulating water.

In the attachment of the connecting-rods to the crankshaft, the forked design is used. That is, one rod has a yoked end, and the other rod for the opposite cylinder fits between the arms of this yoke. So as to make adjustment of the caps as easy as possible, the bearings have been split on a horizontal plane, instead of at right angles to the centerline of the rod.

The New Four-Cylinder Motor

With practically nothing in common with the previous Briscoe motor, the new four is an extremely smooth-appearing design, with the cylinder block and upper half of the crankcase in one piece. The head is detachable, and valves are located on the right and very compactly inclosed. It is suspended at four points in an unusual manner by four brackets which are separate pieces bolting to bosses on the sides of the cylinder casting.

38-Hp. at 1700 R.P.M.

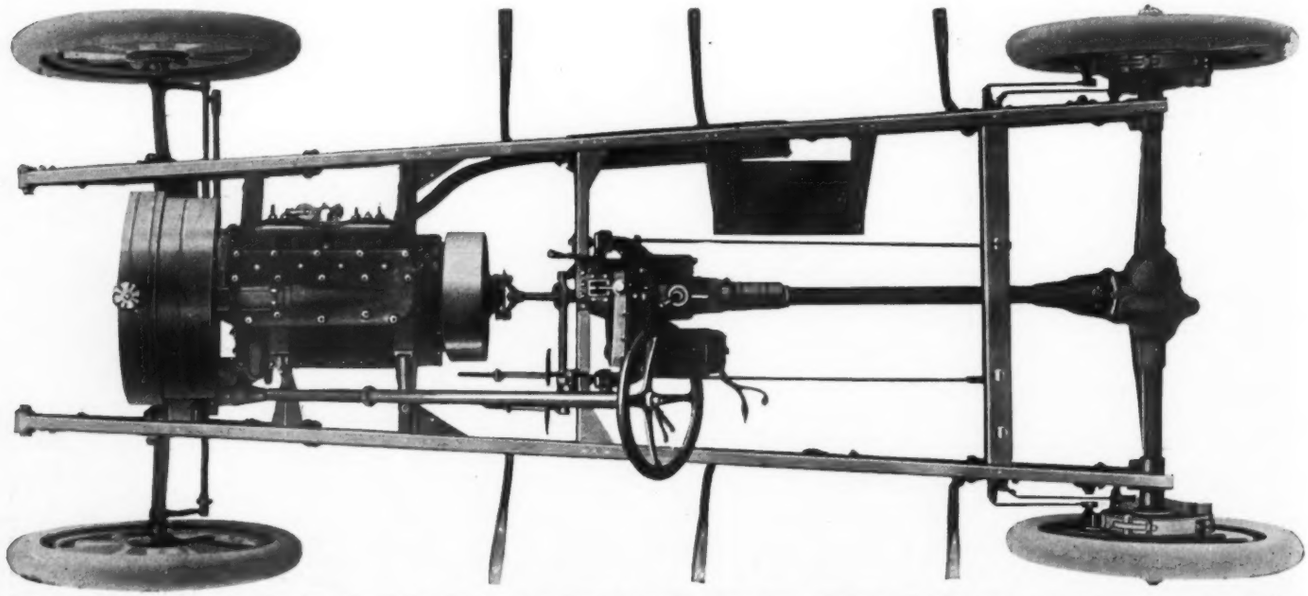
It is of the high-speed type, with 38 hp. produced at 1700 r.p.m. Light pistons aid in permitting of high speed without vibration, and in addition the crankshaft is of large proportions and mounted on three bearings. The connecting-rods are of regular form and forged from chrome-vanadium steel. The piston bearing is in the piston bosses, the upper end of the rod being split on one side, and the pin clamping in it by a bolt. Two bolts hold the cap to the lower end of the rod. The pistons are fitted with two rings, and the heads are concaved, so as to give a desirable semi-spherical combustion chamber.

A few features of the specifications are 1¾-in. valves; front crankshaft bearing, 1⅛-in. diameter, 2¾-in. long; center crankshaft bearing, 1 9/16 in. diameter, 2 in. long; rear crankshaft bearing with a 1⅝-in. diameter, 3¼ in. camshaft diameter, 1 in. The diameter of the connecting-rod bearings is 1⅝ in. and the length is 1¾ in., there being 9⅞ in. between the centers. The flywheel diameter is 14 in. and its width is 4¼ in.

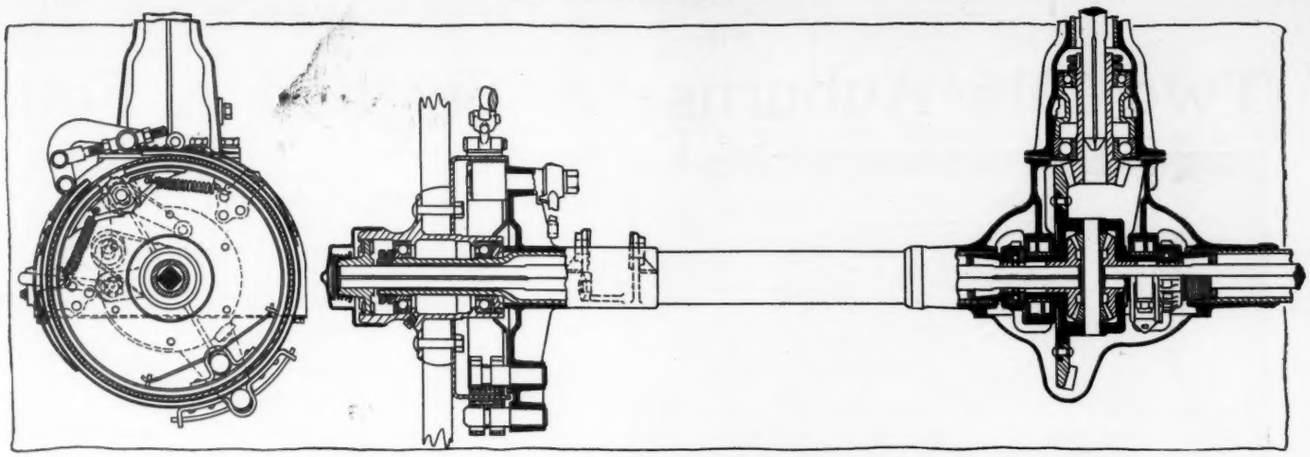
The mounting of the crankshaft is peculiar in that separate brackets bolt to the bottom of that portion of the crankcase which is integral with the cylinders. These brackets have exactly the same function as the usual integral crankshaft bearings in the crankcase, but the construction is lighter, because with equally rigid support, less metal is required than if the entire crankcase were extended down far enough to carry the bearings within it. This is especially true where, as in this motor, the upper part of the case is a part of the cast iron cylinder block. To extend the heavy metal all the way down would add materially to the weight. As it is designed, a pressed-steel cover acts as the lower part of the case housing the crankshaft and these bearing brackets, while another piece closes the bottom and acts as the oil reservoir.

Engine Light but Strong

The whole arrangement, therefore, is designed to make the engine as light as possible, and at the same time crankshaft rigidity and bearing strength are not sacrificed. The brackets are forgings, and the caps are held on by two 11/16-in. bolts which run up to the cylinder block extension, and assist in carrying the bearing load. Thus that part of



The 1916 Briscoe chassis, showing simplicity and clean quality of design. The four-cylinder motor, which is interchangeable with the eight in this chassis, appears in this particular assembly



Details of Briscoe rear axle, wheel and brake as designed for the 1916 four and eight chassis

the crankcase which really incloses the shaft is merely a housing or cover and has nothing to do with carrying the load of the shaft.

Thermo-syphon cooling is well applied to the engine, with a 2-in. water outlet connection integral with the cylinder head. The heads are entirely water jacketed, while the jacketing of the cylinders is uniform, due to the comparatively even thickness of the space around all the cylinders. Also, the water is carried down the entire length of the cylinders, and the water inlet is at the extreme lower front side of the casting.

Friction Drive for Fan

Drive for the cooling fan is unique in that a friction means is employed. The camshaft gear face is made wide enough so that two grooves can be accommodated in the face and back of the gear teeth. These grooves receive two small steel friction disks mounted on the fan shaft. Pins carrying small spiral springs pass through the two disks and the fan shaft flange, thus maintaining an even tension of the disks upon the grooves in the driving gear. The result of this scheme of drive is a noiseless and extremely simple combination which revolves the aeroplane type of fan at the required speed for proper cooling. This mechanism as well as the front gears is all inclosed by a pressed steel front plate.

Atwater Kent Ignition

Driven off the end of the camshaft is the vertically-mounted Atwater Kent ignition distribution unit. The balance of the electrical functions are provided for by the motor-generator mounted on the left side of the gearbox. This charges the battery and lights at 6 volts, and uses 12-volt circuit for starting.

In lubricating the engine, the circulating-splash method is used. The oil is brought up from the reservoir by a plunger pump operated by the camshaft, and it is delivered through a sight-feed on the dash and thence to the oil troughs under the connecting-rods, these having dippers on their caps to catch the oil and throw it to the bearing surfaces, from which it drains back to the sump.

New Gearbox Construction

The transmission mechanism is very simple. The gearbox is really in unit with the torsion tube which surrounds the propeller shaft. The front of the gearbox has two arms which hinge to a cross member. Thus axle variation is due to road unevenness is provided for by this gearbox hinging. As the rear of the gearbox attaches to the torsion tube, there is no frame support for it except at the front.

A floating Salisbury rear axle is fitted. This has two ball bearings supporting each wheel, one on either side of the vertical centerline of the wheel. This is in contrast to the type in which a single bearing is placed directly under the wheel, and there is obviously better support and less chance for misalignment and resultant wheel wobbling. Likewise, two ball-thrust bearings carry the pinion shaft, and there are also roller and ball-thrust bearings on either side of the differential.

Full Cantilever Springs

In its application of cantilever springs, Briscoe uses the full cantilever type, with trunnion mounting at the center to a frame bracket, a sliding bracket at the front, and attachment of the rear under the axle tubes. Plenty of action is afforded, due to this design. This year, bushed spring eyes are provided, making possible the elimination of grease cups.

Three Body Types

Three body types are offered, all of graceful lines. These are the touring car, three-passenger roadster and two-passenger coupé. The roadster is still styled the Clover Leaf, as the center seat is set somewhat back of the two outside ones. The coupé costs $1,000 with four-cylinder motor, and there is, of course, the same exchange proposition for the eight.

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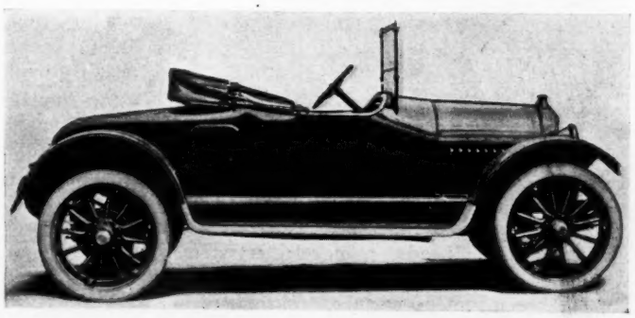
A New Moline-Knight Roadster Model Just Brought Out

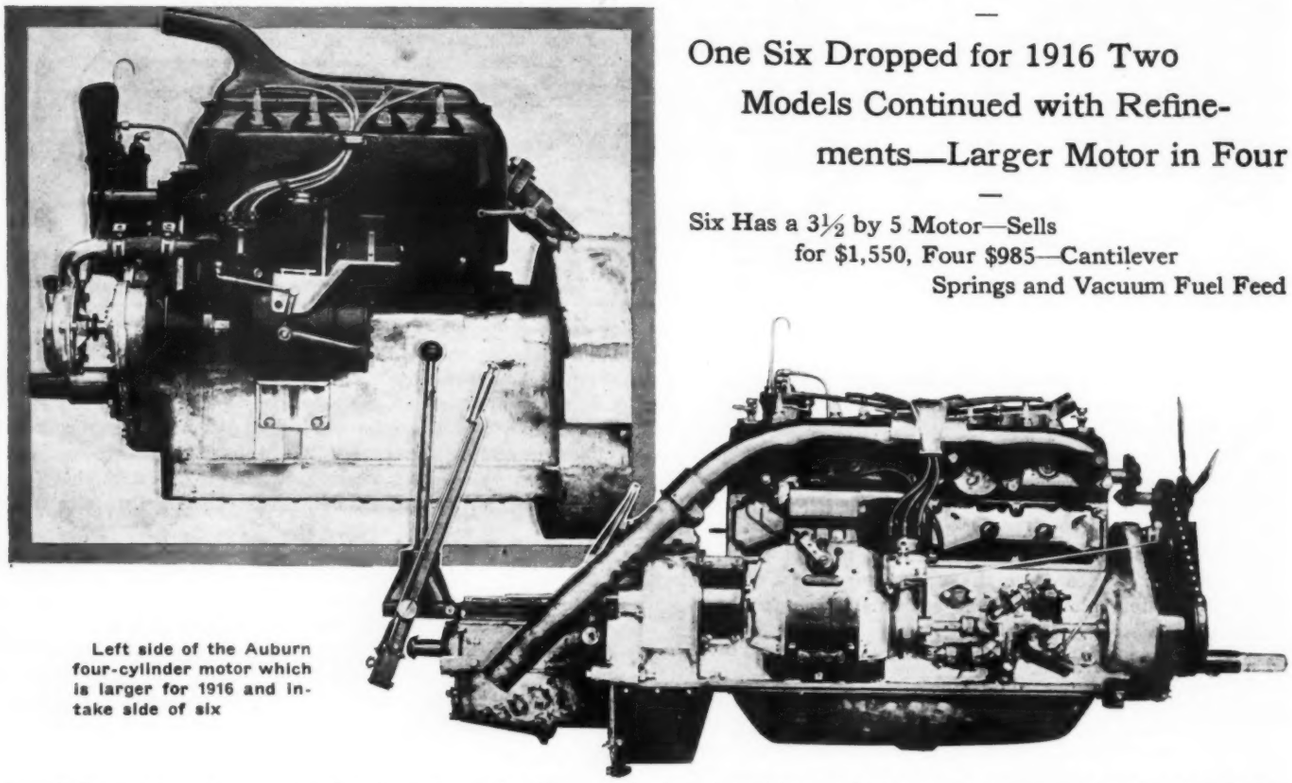


The Moline Automobile Co., East Moline, Illinois, maker of the Moline-Knight, have recently placed on the market a two-passenger roadster listing at $1,475. The new 40 horsepower roadster body is similar to its sister car, the model 50, roadster. It is mounted on the identical chassis of the present five-passenger touring model. The roadster has a large carrying capacity, the rear part of the body being divided into two campartments—one parallel with the seat and entered by an oval shaped door on the right side of the car, while the larger compartment opens from the rear. The large compartment is of such ample dimensions that it will permit the carrying of a steamer trunk, spare tires, suit cases and other luggage

Two 1916 Auburns—A Six and A Four

One Six Dropped for 1916 Two Models Continued with Refinements—Larger Motor in Four

Six Has a 3½ by 5 Motor—Sells for $1,550, Four $985—Cantilever Springs and Vacuum Fuel Feed



Left side of the Auburn four-cylinder motor which is larger for 1916 and intake side of six

TWO models, a four and a six will make up the line of the Auburn Automobile Co., Auburn, Ind., for the 1916 season. For 1915 there were three, a four, and two sixes. For this season the larger of the two sixes has been dropped, and the other continued along with the four. No radical changes have been made in the new models, although some of the alterations are of importance including the introduction of cantilever springs, vacuum gasoline feed with rear tank, flush doors, invisible hinges, flush door handles, roomier bodies and disappearing auxiliary seats in the seven-passenger car.

New Four Has Larger Motor

The four-cylinder model which last season was known as the 4-36 is now known as the 4-38 and in place of the 3.75-in. bore of 1915, the 1916 car has a bore of 3.875 and a stroke of 5 in. the latter figure being the same as for the 1915 season. The stroke bore ratio is 1.29 and the S. A. E. rating 24. A claim of 38 hp. on the brake is made by the manufacturers. As would be expected in a T-head design, the valves are large having an outside diameter of 2 3/16 in. with a port opening of 2 in. clear. The valves are interchangeable with cast iron heads on nickel steel stems.

Other features of the motor are a three-bearing crankshaft, three-bearing camshaft, chrome-nickel steel piston pins and a special patented lubricating system. This is a splash design with two overflow basins located in the lower part of the crankcase. In addition to the regular splash arrangement, there is cast integrally with the upper half of the crankcase an oil pocket over each main bearing. These are kept full, continuously providing oil to the crankshaft.

The timing gears are spirally cut and the generator is mounted on the pump shaft. The starting motor is installed back of the flywheel housing and the pinion meshes with a hardened ring gear on the rim of the flywheel. The wheelbase is 114 in. tread 56 in. and clearance 10½ in. Two bodies are fitted on this design, a two-passenger roadster and a five-passenger touring, both selling at $985, fully equipped.

Six Different in Design

Model 6-40 A is the only six-cylinder car listed by the Auburn company this year. It is an entirely different design from the four having its six block-cast cylinders L-head instead of T. It uses the three-point suspension system in connection with the unit power plant. The cylinders are cast from reverberatory air-furnace iron and then rough bored, finish bored and ground. The pistons are cast from the same grade of metal as the cylinders and are fitted with three diagonally split, concentric expansion rings. The rings in the four are eccentric. Oil grooves are turned on the outside of the piston for collecting and distributing the oil over the inside of the cylinders. Piston pin is of annealed steel tubing, hardened and ground, and held stationary in the piston bosses by means of a simple locking device. The bearing surface is a long, large bronze bushing which is pressed into the connecting-rod.

I-beam connecting-rods are employed made from 0.35 carbon steel, drop-forged and heat treated. The connecting-rod caps are held in place by nickel-steel bolts properly secured by a locking device. The camshaft is drop-forged from carbon steel in one piece. The shaft runs in white bronze bushings and the valve pushrods are mushroom design of special steel.

Three-Bearing Crankshaft

The crankshaft is carried on three main bearings. It has a special thrust arrangement in the form of flanges on each side of the center main bearing. The timing gears are helically cut and the timing set is made up of a crank, cam and pump shaft gear.

An ample size flywheel is bolted to a flange which is drop-forged integrally with the crankshaft. To this it is fastened by six bolts. A leather-faced cone clutch engages with the flywheel and transmits the drive to a gearset providing three speeds forward. These gears are drop-forged from nickel steel and carried on annular ball bearings. From the gearset the drive is taken to the rear axle by a shaft fitted with two universals. The torsional strain on the shaft is obviated by the use of a double tube torque arm, the front end of which is spring-mounted.

Other specifications of this car give the wheelbase as 126 in., tread, 56 in., clearance 10½ in., tires 34 by 4 and body capacity seven and three passengers. The two auxiliary seats in the tonneau of the seven-passenger car are large and are out of the way when not in use, folding back into the rear of the front seat. Full equipment is furnished with both bodies and the price is the same for each, $1,050.

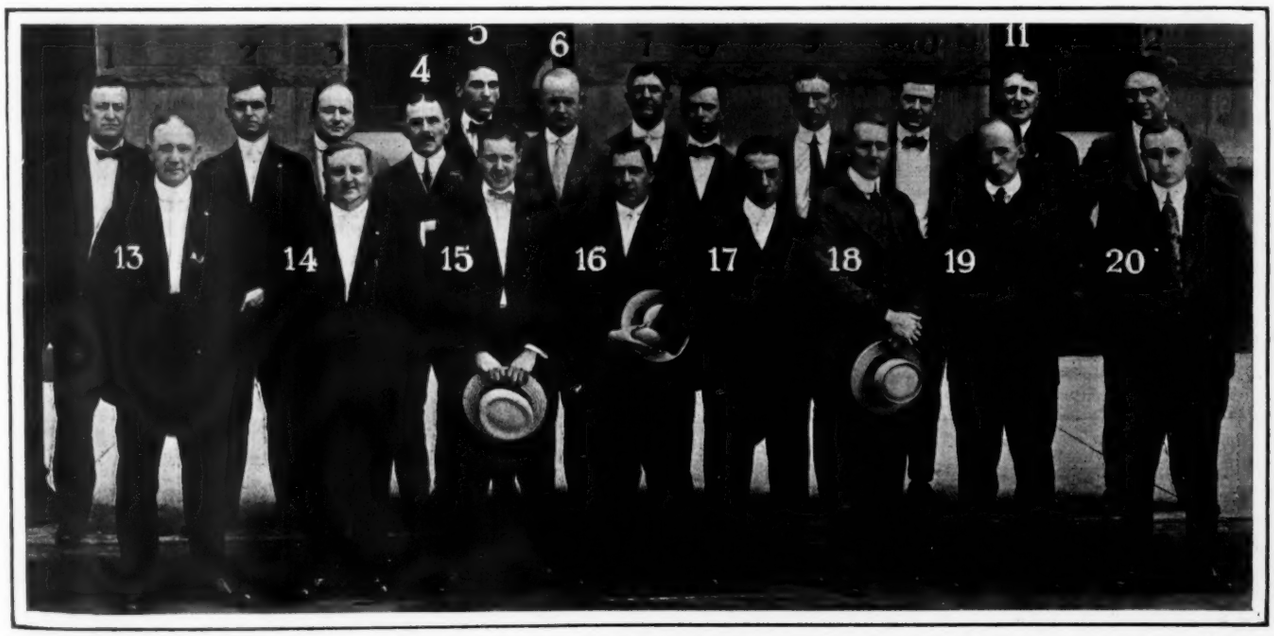
Fifth Avenue bus equipped with safety fender to guard against pedestrians walking into rear wheels

Safety Fenders for New York Buses

NEW YORK CITY, July 19—Long wooden safety fenders have been hung beneath the bodies of all the motor buses operated by the Fifth Avenue Coach Co., on Fifth Avenue, Riverside Drive and other thoroughfares of New York City. The fenders are hung on either side of the buses between the front and rear wheels and curved outward toward the rear so that the rear wheels of each vehicle are thoroughly protected. The fenders are shown in the illustration herewith.

It has been noted for some time past that the majority of accidents to pedestrians in the streets of both New York and London have been those in which the rear wheels have done the damage. It has been a peculiar fact that people wait for the front wheels of the bus to pass them and then heedlessly walk into the path of rear wheels. With the installation of the fenders it is believed that accidents of this kind will be eliminated. This will, it is hoped, eliminate a large part of the few accidents which do occur, as the statistics kept by the Fifth Avenue Coach Co. show that there is only one pedestrian injured to over 1,500,000 miles of service.

One of the interesting phases of the installation of the fenders was the shop work in connection with it. It cost the company $7.50 per fender for labor and material alone and this work was done on the company's own initiative as its safety record has not been criticised. It was desirable that the full fleet of vehicles should appear upon the streets with fenders attached on the same day. With this in view, everything was in readiness for the installation when the crews brought in their buses late Saturday night, July 17. A corps of mechanics was on hand and the fenders, fully assembled, were piled at convenient points nearby. As each vehicle rolled in, it was quickly attached by the workmen, who were equipped with jigs for drilling the frames and long before daylight the twenty-five workmen had fully equipped the 150 vehicles with fenders.



Organization convention of the Sheldon Axle & Spring Co., at the factory in Wilkes-Barre, Pa. The following were present: 1. Thomas Palmer, Gen'l Supt. Spring Mills; 2. F. L. Martin, Sales Mgr. Auto Axle Dept.; 3. H. L. Spohn, Class Journal Co., N. Y. City; 4. G. M. Wall, General Manager; 5. E. W. Acker, Detroit; 6. J. Fred Armstrong, Secretary; 7. J. A. Young, Trenton; 8. Chester A. Ide, Treasurer; 9. R. A. Schaaf, Engineering Dept.; 10. W. M. Jones, Cincinnati; 11. F. W. Kleist, Chicago; 12. David Landau, Consulting Engr. Spring Dept.; 13. O. A. Timberlake, Cincinnati; 14. E. J. Roth, Spring Dept.; 15. E. A. Shelly, Advertising Manager; 16. J. B. Kaler, Eng. Dept.; 17. A. M. Laycock, Chief Engineer Auto Axle Dept.; 18. L. E. Lyons, Detroit; 19. E. B. Flanigan, Eng. Dept.; 20. A. C. Jamison, Chicago

The Rostrum

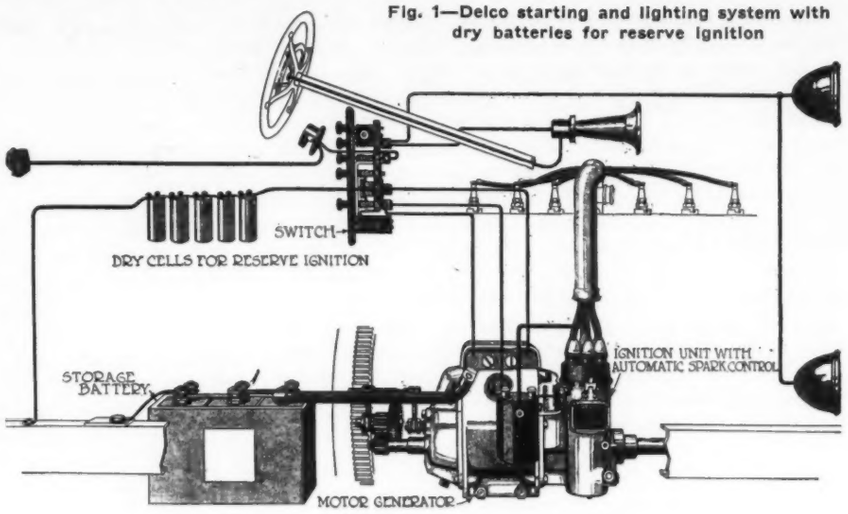


Fig. 1—Delco starting and lighting system with dry batteries for reserve ignition

Wizard D. C. Magneto Can Charge Battery

EDITOR THE AUTOMOBILE:—Several years ago the writer bought a Wizard magneto for furnishing current to run a model N Ford. I still have the magneto and have rigged it up on a 1912 Chalmers 30, and it furnishes current for a Klaxet horn. I have no way of telling the amount of current it makes, but from the way it blows the horn I thought possibly I could charge a 6-volt storage battery with it and in that way could equip my car with electric lights. This instrument was made by the Hercules Electric Co. of Indianapolis, and is their type FS-1.

As I understand it, it would require some means of controlling the output and a relay ammeter, etc. What information can you give me on this?

2—Would appreciate an estimate by you on the cost of everything necessary, exclusive of the battery and lamps.

Kings Mountain, N. C. W. S. D.

—Since the Wizard magneto is a direct current instrument, referring to type FS, it may be used for battery charging. This magneto can be used without an automatic cutout and when this is done it can be direct-connected to the motor by belting, the pulleys being so arranged that on minimum motor speed, the magneto speed will not be below 1600 r.p.m. At average motor speeds, the magneto speed should be around 2000 r.p.m. An installation of this kind will be the most simple because with it, the only switch which is required is a simple cutout placed between the magneto and the battery so that when the engine is stopped the circuit is broken and there will be no danger of the battery becoming discharged through the current flowing back through the magneto. Should this happen, it would be virtually a short circuit of the battery and would not only discharge same, but would also be likely to destroy it. When the magneto is connected to the battery in this way, direct-connected brushes or shunts should be used in the brush holders.

The Wizard magnetos are made for commercial power engines, and are designed especially for ignition with this class of work. For this reason, they require any transformation work to be done by mechanics of electrical knowledge and experience. It would therefore, be advisable in case you are not so equipped to turn the work over to an electrician.

2—The price would vary to such an amount with the manner of installation, that it would not be possible to give an estimate upon it which will be sure to be accurate.

In work of this kind it is rare that even the mechanic will fix his price in advance.

Dry Batteries Can Be Installed for Ignition

Editor THE AUTOMOBILE:—I have a D-45 1916 Buick which does not come equipped with dry batteries. Can they be installed? If so, how?

Would four batteries be sufficient for starting, in case the starting system should get out of order?

Round Lake, N. Y. W. N. G.

—Dry batteries are of practically no use on a car equipped like the Buick 1916, as the storage battery in the first place is sufficient for all requirements and in the second place, the batteries could not be substituted for the storage battery because the generator could not charge them and the chances are the generator would be damaged by working against the dry batteries. An ammeter is fitted on this car which shows immediately if the battery is not charging and gives plenty of warning should the storage battery be out of order. If you desire to fit an entirely separate dry battery ignition system working on the dual principle, it can be done by fitting the dry batteries to the car, then wiring to the distributer and coil, allowing the same high tension plug leads as are used for the present ignition system to carry the dry battery current. This would be solely an ignition system and would have nothing to do with the lighting or starting system which cannot be operated on dry batteries. As there is not sufficient energy contained in them.

Should the storage battery go wrong, which is quite unlikely, in a 1916 car for some time, you would have to start with the hand crank. In installing the dry batteries, five cells should be used, one terminal of the series connection being grounded and the other connected with the battery ignition switch. A diagram of the Delco system with dry cells for reserved ignition, is shown in Fig. 1. This is regularly placed on some cars.

Lifting Brush Protects Generator Circuit

Editor THE AUTOMOBILE:—In case it becomes necessary to take a battery off any of the starting and lighting systems of a car to be repaired, will the lifting of a brush protect the generator until the battery is put back into place?

2—Kindly explain by sketch the proper way to put new wristpins and bushings in a motor.

Pelham, N. Y. J. D.

—You do not state the make of generator to which you refer and hence it is impossible to give you other than a general answer with a few definite examples to cover the case you

mention. In general, it may be stated that the brushes of the generator should be removed if the battery is disconnected and the motor in use. Referring to the Gray & Davis system, for instance, if you were to remove the brushes a short circuit would be avoided and the possibility of burning out the dynamo would be removed.

Referring to the Delco ignition system, the lifting of one of the generator brushes will protect the generator during the operation of the car when the battery is removed. This method applies to all Delco generators prior to the 1916 production.

A constant potential system in general is not liable to injury if operated without the battery. A constant current system must be handled differently, as when operated without the battery, and no lamps lit, the generator endeavors to produce the constant current for which it is set and the only available place for this current to go is through the field circuit. The generator therefore reaches a sufficiently high voltage to send its rated current to the field circuit which is usually so high as to damage this field circuit unless individuality of design makes special provision for this and takes care that it does not occur.

On the Bijur system for example, the voltage regulated machine does not require any special attention to protect it and the lights may be operated directly from the generator if desired. On the constant current systems, however, produced by this concern, the brush must be lifted to protect the generator. On this instrument, the fields are excited from an auxiliary or regulating brush. On the Bijur Flexo generators, a fuse is provided in the field circuit which will automatically open the field circuit before damage occurs in case the gasoline engine is operated with the battery intentionally or accidentally disconnected. The most convenient way to protect the generator with this system when the battery is to be removed, is to remove the field fuse. The single unit systems do not have the field fuse and with them other means, such as lifting the auxiliary brush, should be used.

The automobile lighting generator of constant current type, with bucking series regulation, should not be run above the balance speed when disconnected from the battery. In case it is necessary to run the generator without the battery, the lamps and generator winding may be protected by removing either the positive or negative brush. This prevents the generation of a high voltage.

The Westinghouse lighting generators for automobile use using a Westinghouse automatic voltage regulator may be operated without the battery for a limited time without damage. This is possible because the voltage regulator prevents the voltage from being raised above a definite amount and protects the lamp and generator winding from being burned out.

2—Before this question could be answered properly by sketch or otherwise, it would be necessary to know the make of motor in order to determine the manner in which the piston pin is fitted. In some motors, the pin is held tightly at the upper end of the connecting-rod and oscillates in the piston bosses. In most motors, however, the wristpin is fixed in the piston bosses by means of a set screw which is passed through the boss and pin inside the piston and which must first be taken out before the wristpin can be driven out. This is a driving fit as a rule and can be hammered out by using a punch. The bushing for the wristpin generally fits in the upper end of the connecting-rod and is simply a bearing bushing which is installed in a manner depending upon the exact construction of the rod.

Tire Gages Proved to Be Inaccurate

Editor THE AUTOMOBILE:—A word of warning concerning the accuracy of tire gages might not be out of place.

Yesterday, while inflating with the free air supplied by that courteous gentleman, the garageman, three other drivers stopped and the subject of gages came up. Four gages were produced from as many pockets and all of different make. When tried on the same tire they were found to vary 15 lb. in their reading.

What of others in other pockets and their effect on tires? I submit the case to you.

Lansing, Mich. M. BECK.

—There is no question but that tire gages ought to be reasonably accurate and a variation of 15 lb. at an 80-lb. inflation is certainly more than reasonable. The question seems to be one which merits the attention of the gage manufacturer and also of the motoring public, who should insist on a comparison with a known accurate gage at the time of purchase. Naturally a dealer does not wish to sell inaccurate gages and if the customer so desires, he will be glad to compare the gage with one of known accuracy and if it is not within close limits, he should return same to the manufacturer. Gages should not vary to this extent ordinarily, because the concerns making them as a rule exercise quite rigid inspection methods to guard against this inaccuracy.

Transforming Phaeton to Fast Roadster

Editor THE AUTOMOBILE:—We have a 1913 Cadillac, phaeton body which we want to convert into a fast roadster. Can you give me any information regarding how we can fix up the engine? Also any other advice which you may have will be appreciated.

York, Pa. T. S. P.

—Generally, in arranging a motor for higher speeds, but two operations are performed by the ordinary motorist. One is to advance the magneto timing so that ignition is far enough advanced for the highest speed, and the other is to adjust the carbureter for high speeds. Sometimes the added expense of another camshaft is gone to, but not very often, as this entails the laying out of cams adapted to racing and the manufacture of an individual camshaft and the grinding of individual cams, which requires considerable money.

Another step which is often taken in adapting a motor to racing is to grind out the valve passage to allow for larger valves. On most motors this cannot be done and on the Cadillac the amount of metal which can be taken off at the valve seat would not justify the expense of the larger valve. If you will fit tight piston rings, advance the timing as far as you can carry it without having the motor knock and then adjust the carbureter so that a good powerful mixture is given at high speeds, you will probably have as good results as you desire. With the lighter roadster body, you would probably be able to stand a higher gearing than you have at present. As the country is hilly around York, however, it would be best not to go too far in this respect to get good performance. The same thing must be remembered in advancing the spark, in order that you will have good running when the engine is laboring in hill climbing.

Two Plugs Fire at Same Time

Editor THE AUTOMOBILE:—Having occasion a short time since to replace the crank, also the camshaft gear in a model B DeTamble D. opposed motor, after setting cams and magneto to fire at compression, was unable to get an explosion in the motor. The compression seemed good; also have new batteries. The plugs fired simultaneously. This car carries a Kurtz low tension magneto.

Three garagemen examined this and some said that it should not fire both plugs at once and others said it made no material difference. Can you say whether any cars fire two plugs in different cylinders at the same time?

3—I had an argument some time ago regarding the rota-

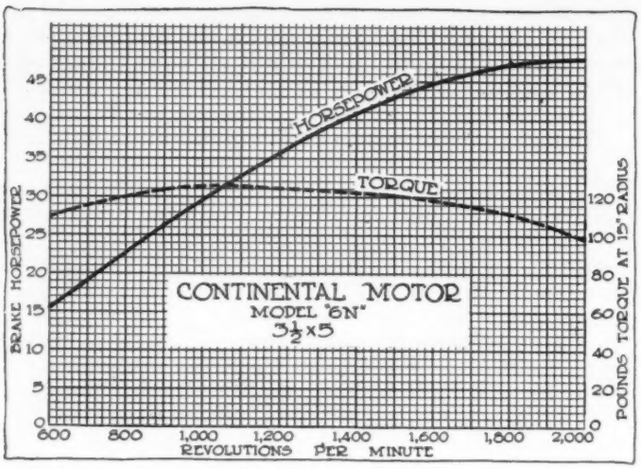


Fig. 2—Horsepower curve of 3½ by 5, six-cylinder Continental

tive speed of a camshaft. Can you mention a four-cycle motor wherein the rotative speed of the camshaft is different than at half of the crankshaft speed? The party claimed that it was different in different motors.

Hopkinton, Iowa. D. S.

—It is quite common practice with opposed motors for the magneto or ignition apparatus to be so arranged that a spark occurs in both cylinders at each revolution. This makes no difference as one cylinder will be on the exhaust stroke, with the other at compression. The reason you could not get an explosion was due to some other cause than that of ignition as long as you secured a good spark in each cylinder.

2—We have no record of any automobile employing a four-cycle motor in which the rotative speed of the camshaft is different than half crankshaft speed. Since the separate functions of a four-cycle motor occur at the same point during each alternate stroke. There are special design four-cycle motors with eccentric shafts geared one-to-one. Such a motor is described in this issue on pages 162 and 163.

Many Causes for Missing Motor

Editor THE AUTOMOBILE:—Would like an opinion on my motor trouble. My 1914 four-cylinder Studebaker misses when idling and when driving on high in different cylinders at less than 12 m.p.h. causing a very bad jerky motion apparently in the rear universal. Have had the valves ground recently and there is fairly even compression. The ignition seems to be all right and no change in the carbureter, which is a Schebler, seems to help it. There are apparently no air leaks and the car operates well when the motor has to pull; that is, when on a slight grade or on heavy roads.

Victor, N. Y. E. T. S.

—The motor missing may be due to loose connections in ignition wiring; broken conductors; breaker points burned out, dirty or improperly adjusted; valves not seating properly; dirt or water in gasoline; spark plug points improperly adjusted or not set deeply enough in the valve caps; weak battery; valve spring weak or broken; mixture too rich, or too lean; particles of carbon under the valves; defective spark plugs due to cracked porcelains or other causes; air leaks around the intake manifold, valve stem guides, valve caps, spark plugs or petcocks; valve lift improperly adjusted and many other minor causes. A good order of procedure would be to take the simplest points of the above list and go through those checking them off and then go into the more complicated causes.

The distributer contact should be carefully examined to see that good contact is being made and especially that all the contacts are clean. In case the valves are not seating properly, and the valves have been reground lately, examine the valve seat in the cylinder to see if it has become deeply pitted. It is sometimes necessary to take a light cut off the valve seat in the cylinder before proper seating can be secured.

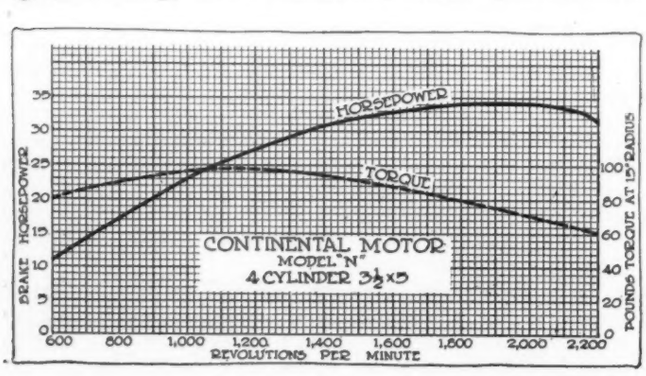


Fig. 3—Horsepower curve of 3½ by 5, four-cylinder Continental

Horsepower Curves of 3 1-2 by 5-Inch Motors

Editor THE AUTOMOBILE:—Have you a power curve of a typical 3½ by 5-in. motor such as in use in the representative makes of automobiles? What horsepower do these motors deliver at a speed of about 800 r.p.m.? I am figuring upon building a small gasoline tractor and any information you can give me about this size motor will be appreciated.

Mentone, Cal. J. L.

—Horsepower curve of typical 3½ by 5-in. motors such as are used in representative cars are shown in the accompanying illustrations. From these curves the horsepower and torque of this size motor at different revolutions per minute can be determined and as these curves give about as good an idea of the characteristics of this size motor as anything can do, further comment is unnecessary.

Connecting-Rod Bearing Probably Loose

Editor THE AUTOMOBILE:—I have a 1915 small Winton six and it developed a knock in the engine after running about 300 miles. This knock takes place when the car is running slowly on direct, or when the throttle is being opened and the car picking up. It seems to come about every two revolutions of the crankshaft. At the Winton shop they tell me that it is probably a side play of the connecting-rod between the piston bosses. I do not think that this looks probable as a connecting-rod with side play would also have side play on the crankshaft. They advised me to run the car a little and see if the knock did not disappear. I have run it 1000 miles and it is naturally still there. Can you give me any information on this?

Hopkinton, Mass. F. A. R.

—From the information you give the motor is evidently suffering from a connecting-rod knock. It is impossible to state whether the knock is due to side play or bearing looseness. Another possibility is that the motor has a piston slap which occurs at every explosion stroke. It sometimes happens that practically all the bearing of a piston is taken upon one ring. The result is that the piston oscillates about this ring which gives rise to a slap audible every two revolutions. Since you have had the car such a short time, you no doubt can make arrangements with the Boston branch of the Winton company to have this repaired.

Bad Oiling System Cause of Smoke

Editor THE AUTOMOBILE:—The other day when you found yourself in a dark blue fog of oil smoke, choking your breath and smarting your eyes, did you cuss motor cars in general? Well, you shouldn't. They do not all smoke—there is no real reason for any of them to be even in the slightest degree

objectionable on this score. You see many cars which are perfectly free from smoke from the exhaust. This *should* be the condition with all of them.

In some instances, it is true that the car user is responsible because he either carelessly or deliberately allows his motor to be over-supplied with oil. In the majority of cars which are smokers, however, the fault lies with the manufacturer. He has neglected to incorporate in his motor a competent oiling system.

The fact that many cars, or many different makes of cars do not look like soft coal burners turned loose on the street is ample and sufficient evidence that cars can be satisfactorily operated without the plume of odoriferous oily smoke.

The car user is as vitally interested in not smoking as his neighbors can be. The smoke offends them and destroys their peace of mind, but it costs the car owner dollars of his hard earned cash. For excessive smoking from a motor exhaust indicates the use of an excess of lubricating oil. The use of too much oil is not merely unnecessary, but positively vicious. It induces undue carbonization of valves, spark plugs and cylinder walls.

Carbon on valves means that they cannot properly do their work, and you have a motor of the hit and miss variety. Carbon on spark plugs means that they will ultimately short so cannot fire properly and must be removed and cleaned, which work, mark you, cures the trouble only temporarily.

A coating of carbon deposited upon the walls of that part of the cylinder used as a combustion chamber means a gradual increase of compression until finally your motor knocks easily when called upon to do a bit of real work. Such knocking is not pleasant or enjoyable, and if allowed to persist, causes undue bearing wear; such a condition means trouble of that variety which soon gets you into the mood where you feel like consigning your car and all that concerns it to that place where woolen underwear is not regarded as an absolute necessity.

Public demand has put the carbureter where it spends its time vaporizing gasoline, and does not try to set itself up as a perfume factory. Why not insist just as strongly that we get rid of that blue, greasy, foggy cloud of smoke from excess lubricating oil? It's easily done.

Detroit, Mich. W. A. BRUSH.

Formula for Calculating Piston Displacement

Editor THE AUTOMOBILE:—How do you calculate the displacement of a four-cylinder engine, a six-cylinder and an eight-cylinder engine in cubic inches? What I want to know is this: What is the displacement of an engine with four cylinders and a bore of 4.5-in. by 6.5-in. stroke? The formula I used was the following:

$\pi R^2 H$. $\pi = 3.1416$

$R^2 = R^2$ or radius squared

$H =$ Stroke of cylinder or 6.5 in.

The above formula is for one cylinder and for a four-cylinder engine would be four times the result of the above formula. The following is the result I obtained:

$\pi R^2 H$. $\pi = 3.1416$ $R^2 =$ Radius squared

$H =$ Stroke

4.5-in. bore by 6.5-in. stroke.

$R = \frac{1}{2}$ of 4.5-in. $= 2.25$ in., 2.25-in. squared $= 5.0625$ in.

5.0625 by $3.1416 = 16.00435 = \pi R^2$

16.00435 by stroke, or $6.5 = 104.028275 =$ Displacement of 1 cylinder; hence, for 4 cylinders $= 4$ by 104.02625, or 416.1131 cu. in.

I feel confident that the above formula is not correct and would thank you to put me right on this.

Detroit, Mich. E. M. DEW.

—Your method is absolutely correct but you have not carried out the work correctly. The fault is in the multiplication of 5.0625 by 3.1416. You have obtained as a result 16.00435 whereas, this should be 15.90435. Carrying the work to a conclusion will give you piston displacement of 413.5 which is correct for this size motor.

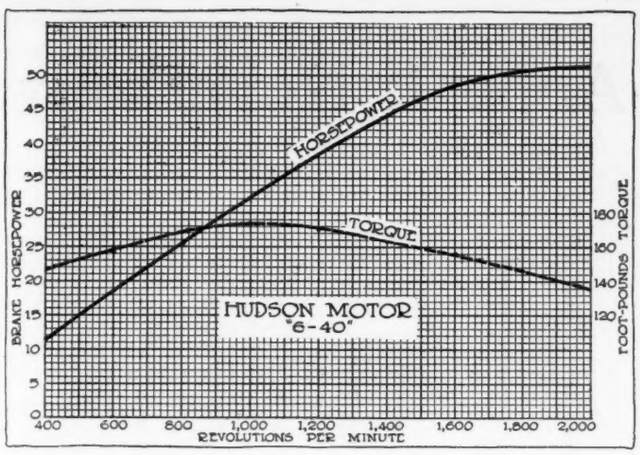


Fig. 4—Horsepower curve of 3½ by 5 Hudson six motor

Dimensions of Blitzen Benz and Jay Eye See

Editor THE AUTOMOBILE:—What is the size of the bore and stroke of the two racing cars, Blitzen Benz and Jay Eye See?

2—What compression have they?

3—What is the comparison of gears?

4—What are the sizes of the front and rear axles?

5—What is the horsepower?

St. Louis, Mo. R. L. H.

—The bore of the Blitzen Benz is 7.2835 and the stroke 7.8741 in. The Jay Eye See has a bore of 9.75 and a stroke of 8.625 in.

2—We have no records of any compression measurements on either of these two motors.

3—The gear ratios are changed frequently to meet track conditions.

4—The meaning of this question is not exactly clear as you do not state to which axle dimensions you refer. Since THE AUTOMOBILE has no detailed drawings of these parts at its disposal, a full set of dimensions cannot be furnished. The horsepowers of the two cars according to the S. A. E. rating would be 85 for the Blitzen Benz and 152 for the Jay Eye See.

Sign Your Inquiries

THE AUTOMOBILE is in receipt of a number of inquiries signed by initials, the words Subscribers, Reader, Interested, etc. Since these letters give no clue to the sender they cannot be published in the Rostrum Columns. If you desire to use a nom-de-plume it is only necessary to add it to the signature, but the signature is necessary as an evidence of good faith.—Editor.

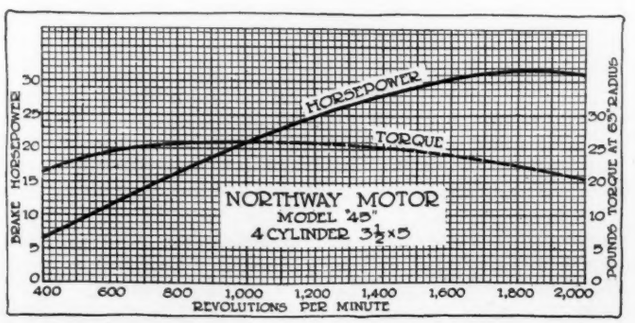
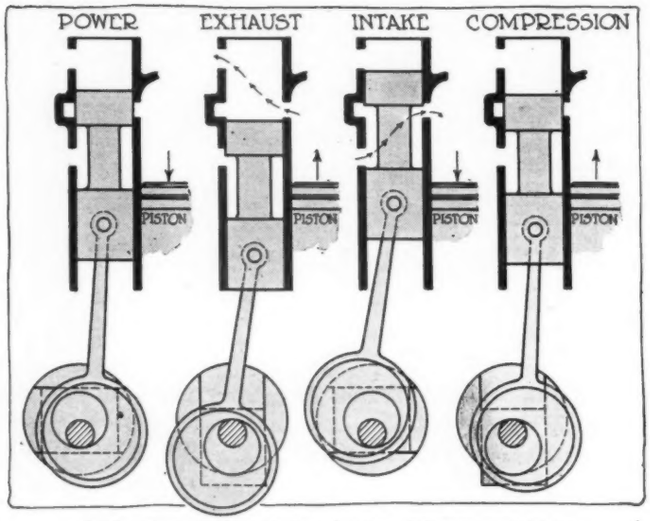


Fig. 5—Horsepower curve of 3½ by 5 four-cylinder Northway

Appel Is Novel Valve-Driving Mechanism

A Positive and Silent System for Piston or Poppet Types



Cycle of operation of Appel valve-driving mechanism

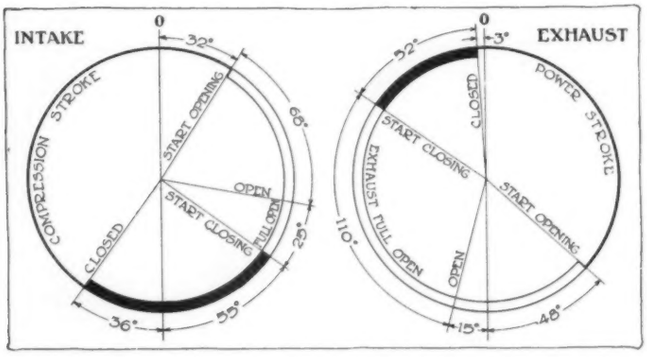


Diagram of Appel valve gear on intake and exhaust strokes

A VALVE-DRIVING mechanism for piston or poppet valves which is designed to be at the same time positive and silent, has been brought out by Daniel Appel, Cleveland, Ohio. This article is not being manufactured at the present time but has been brought out and is described as a novel development in valve gears.

The valve gear is so designed that it will operate a piston valve from a valve shaft which is driven at crankshaft speed by a set of one-to-one gears. On this shaft which is mounted as a countershaft on the model engine shown in the accompanying illustration, are arranged the operating eccentrics, one eccentric for each cylinder of the engine. The eccentrics are in pairs and are spaced at 180 deg., and between each pair of eccentrics and surrounding the valve shafts is a cylindrical rotary member which is arranged eccentrically with respect to the valve shaft and has a central sleeve-like portion journaled in a suitable bearing and provided at its ends with disk-like projections. The outer faces of these projections are provided with central transverse slots at right angles to each other and have parallel sides forming slideways for the slide blocks of the operating eccentric.

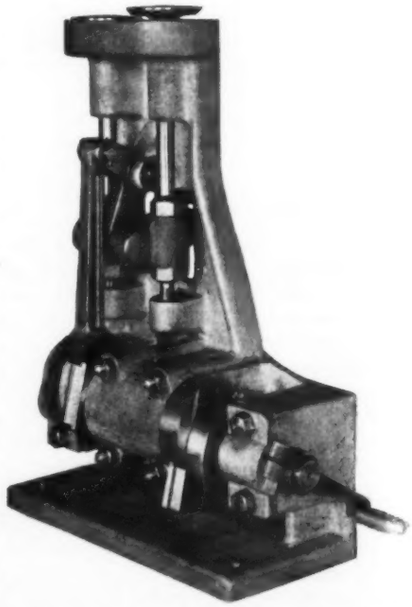
These slide blocks which form a part of the valve operating eccentric are bored to receive, with a running fit, the driving eccentrics of the valve shafts. Each block carries a valve operating eccentric which engages an eccentric strap and a transmitting rod, which operates the valve. This is shown in the constructional section view.

Rotary and Horizontal Movements

The drive is such that each of the slide blocks is given two movements, a rotary movement and a horizontal movement. Two cycles of reciprocating movement, and one cycle of rotary movement are completed during one complete cycle of engine operation. The resultant of the two movements, the rotary and reciprocating, is imparted to the valve operating eccentric, the center of which during one complete cycle of engine operation describes a closed approximately elliptical figure, having a re-entrant horizontal inward loop at one side about midway between the upper and lower ends of the figure. The center of the valve-operating eccentric while sweeping through the path of movement, has a velocity which varies from a high maximum to a low minimum. Assuming that the valve is in its lowest position with the center of the eccentric at the lower end of the figure or path of movement, and that the piston is at or near the middle of the exhaust stroke, the center of the transmitting eccentric is now at its maximum distance from the axis of the valve shaft and traveling upward along one side of the elliptical path of movement. This travel has the effect of giving the piston valve a very rapid stroke upward to its full open position so as to close the exhaust port and open the intake port. The intake port is full open when the valve reaches its uppermost position.

During the later part of the suction, and the early part of the compression stroke, the valve is given a quick but diminishing half-stroke downward, closing the inlet port, but at or near the end of the suction stroke, and during the major part of the compression stroke, the movement along the figure of travel is very slow, little movement being given to the valve.

When the center of the transmitting eccentric is near the end of the loop, firing takes place, and during the major part of the working stroke, the center of the eccentric is passing along the upper side of the loop, imparting practically no movement to the valve. During the latter part of the working stroke, and early part of the exhaust stroke, the valve is again given a quick and accelerating half-stroke downward to its lower position, again opening



Model of Appel mechanism as developed for poppet type motors

the exhaust port for gas passage.

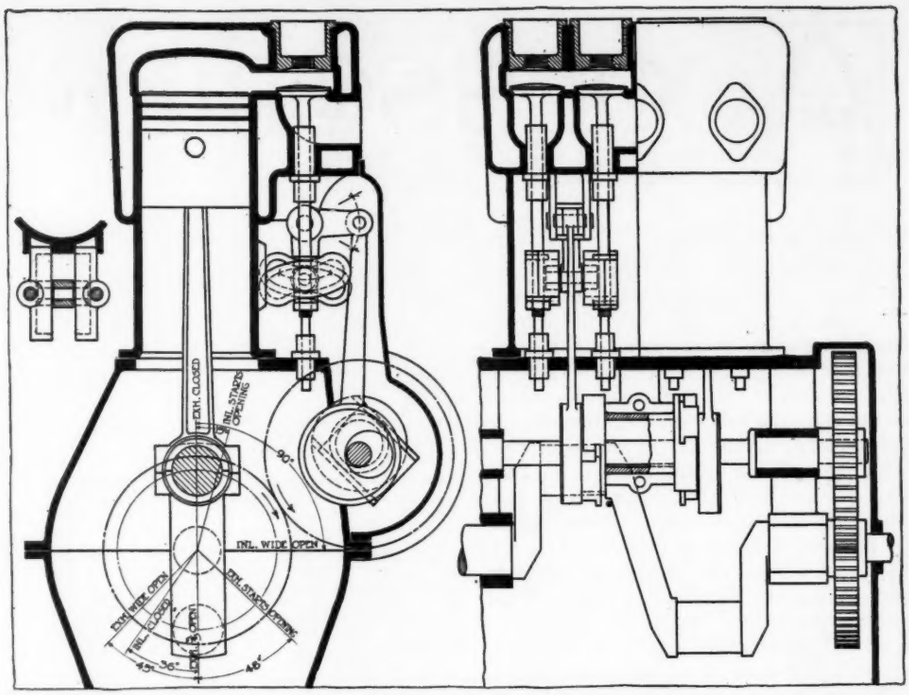
It will be seen that the movements thus given to the valve are such as are required to cause the piston valve to function in the desired manner, for the inlet and exhaust ports are opened and closed at the proper time and the valve is held almost stationary in the mid-position with both ports closed during the major portion of both the compression and working strokes.

Use Both Movements

The two valve eccentrics used in this gear have both the movements which have been described. The exhaust valve passes through its cycle 90 deg. before the intake valve and in a four-cylinder motor for the other two cylinders, an identical valve gear is provided with the proper timing.

Timing for Poppets

While this mechanism is intended primarily for piston or any other type of non-seating valves, it will also operate poppet valves if connected with a device which will divide the valve gear movement so that the upward motion above the loop of the elliptical diagram will operate the intake valve and the downward motion below the loop the exhaust valve. The loop movement itself takes care of the inactive period of compression and expansion. Such a poppet valve operating device is shown in the accompanying illustration. The movement of the poppet valve will be readily understood from the accompanying illustrations, the movement imparted to the bell-crank being identical with the piston valve motion above described.



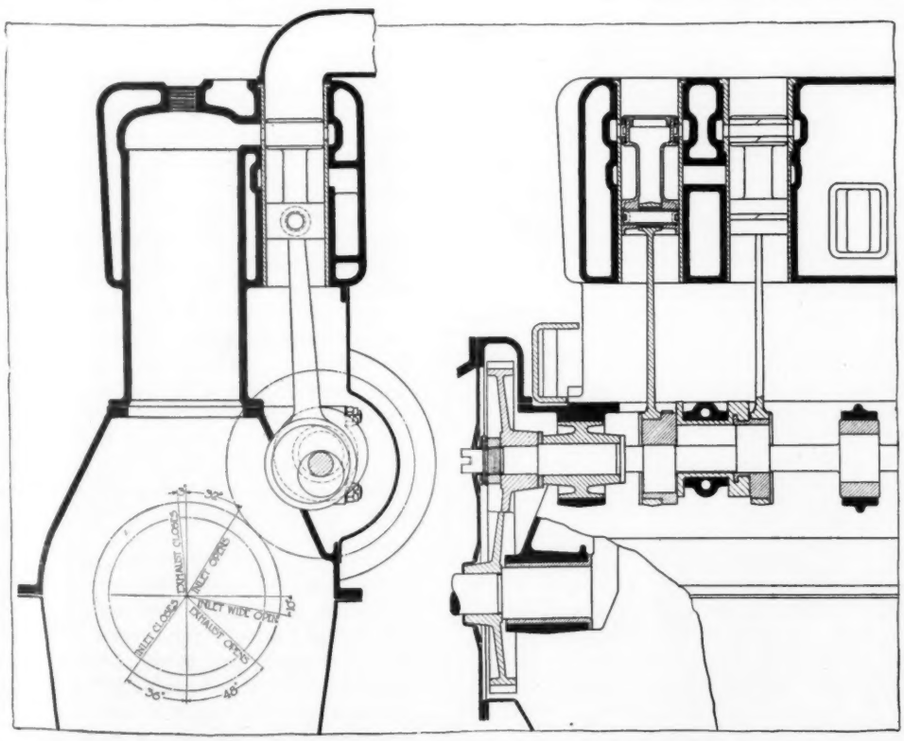
End and side sections of Appel valve-actuating mechanism with timing on a poppet-valve motor

The elliptical figure which is described by the valve linkage in its movement is shown in the sectional view of the poppet construction. The re-entrant loop will also be noted in this same figure. The functioning of the valve is so arranged that the quick opening and closing is secured without the noise which occurs from hammering of a follower on a flat-sided cam.

As will be noted in driving a piston valve the action is direct, the eccentric rod being pivoted directly to the piston valve and transmitting the motion imparted by the eccentric and slide-blocks without any intermediate linkage. For this reason, the full advantage of the motion would be gained in a piston or sleeve valve, although the action is not at all undesirable for poppet valve motors due to the possibility of securing quick opening and closing.

One of the advantages claimed for this type of drive is that at no part of the cycle is there any impact between different members of the operating mechanism, all contacts being of a sliding nature and hence without shock. No sacrifices in timing need therefore be made considering the intervals between the time that the valves start to open and are fully opened. Referring to the diagram given on the opposite page it will be noted that the intake starts opening at 32 deg. and is fully opened at 100, the travel being through 68 deg. while opening. The valve remains full open during a period of 25 deg.

With the exhaust the opening period is 63 deg. and the valve remains fully open during 110 deg. and closing during 52 deg. This timing can of course be varied.

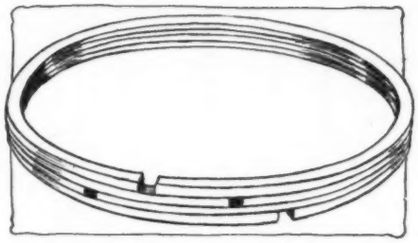


Sections through piston-valve motor with the Appel valve-driving mechanism. Note timing

ACCESSORIES

Perfection Piston Rings

PERFECTION is the title of a piston ring of the multi-part, anti-leak variety. It is in the form of four small rings fitting into a single groove, the rings being made of special soft steel, heat treated, so that they soon lap themselves into the cylinder, and because of the softness of the metal, as compared with the cylinder walls, there is said to be no possibility of scoring the latter. This type of piston equipment is claimed to prevent leakage of mixture and oil past the piston. An additional advantage is that in installing the ring it is not necessary to spring it over the piston head. The separate rings are made in sections less than ⅛ in. wide and afford sufficient space to retain oil between the sections and also between the unit ring and the groove.—Automobile Construction & Engineering Co., Philadelphia, Pa.



Perfection piston ring which is made as four small rings fitting into a single groove, these rings being made of special soft steel so that they cannot score the cylinder walls

Belfast Racing Seats

To meet the demand for racing type seats which can be installed on any body by simply fastening them to the body frame with wood screws, the Belfast seats have been produced. The back is of 22-gage metal, well ironed to the wood-framed bottom and upholstery is in red or black imitation leather, well padded. The bottom cushion is removable and the back of the seats is painted battleship gray. The seats sell for $8 each or $15 per pair.—Belfast Mfg. Co., Station K, Cincinnati, Ohio.

One of the Belfast racing seats designed for cars remodeled into raceabout or speedster types. They are light but strong in construction and the cushion is removable

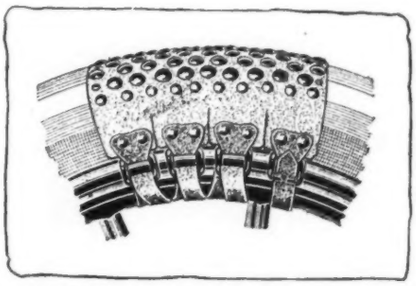
Schrader's Valve Box

As an improvement in the packing of its valve insides, the Schrader organization has brought out a small tin box large enough to carry five insides. This container is damp proof and dust proof, and is grooved so that each inside is kept separate from the rest, insuring their reaching the consumer in perfect condition. The box will appeal especially to dealers who have had to handle the valve insides in bulk up to this time. The box sells for 20 cents.—A. Schrader's Son, New York City.

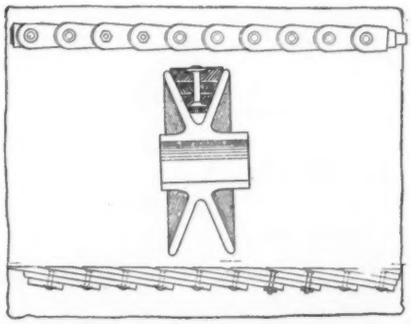
Peerless V-Belts and Boots

A strong and flexible V-belt for fan service, which hugs the pulley well. Both chrome and oak-tanned leathers are used. Prices, chrome, ½-in., 60 cents per foot; ⅝, 66 cents; ¾, 72 cents. Oak, 42, 48 and 54 cents per foot.

Elk leather is being used on a number of the Peerless products, one of the products being a heavy boot, fitted with straps so that it can be attached to any tire. The leather is tanned in such a way as to make it non-stretching and waterproof, the maker states; and the tread is reinforced with a studding of flat-headed rivets that will stand about 1000 miles service. The attaching straps are of 1-in. width, of heavy stock. A lighter strap boot is also made, as well as light and heavy boots of the hook type. Price, 3-in., $1.95; 3½-in., $2.25; 4-in., $2.50; 4½-in., $2.75; 5-in., $3.—Leather Products Co., Denver, Col.



Peerless tire boot made of heavy elk leather and studded with steel to endure 1,000 miles of service. The attaching straps are 1 in wide and of heavy stock



Peerless built-up type of leather V belt for fan drive which comes in both chrome and oak-tanned stock. It hugs the pulley

Bumper and Fender

A combination bumper and fender is shown in this sketch, the idea being that the usual position will be horizontal, but that the driver has a hand control that allows the device to drop should an accident threaten. Since the bumper fits on the spring bolts it is easy to attach, and no holes have to be drilled. It can be adjusted to suit any sort of car, though special patterns are made for Fords and trucks. Three classes of finish are made, all black, part nickel and all nickel, the prices being $22.50, $25 and $27.50, respectively.—Auto Safety Fender Co., Pittsburgh, Pa.

Raffia Tonneau Mat

A green tonneau mat of raffia grass which is very soft but tough and which is claimed to be more durable than other varieties of tonneau floor coverings has been put on the market recently. It is made in all sizes and for all makes of car, the price varying from $5 to $7, according to the size.—Pastre's Auto Garage, Brooklyn, N. Y.

Orolo Carbon Remover

A new carbon remover and engine cleaner is called Orolo. This is a liquid, which, when heated is said to be immediately converted into gases which completely destroy the asphaltum contained in carbon, leaving only a black powder or soot which is blown from the exhaust when the motor is started. It contains no acid, is not injurious to human flesh and cannot possibly injure metal of any kind. This is demonstrated by the fact that it is put up in thin, sheet-iron tinned cans. The use of Orolo every 30 days or 6 weeks will keep a motor free from carbon and add at least 300 per cent to the life and efficiency of the motor, it is claimed. It sells for $2.50 a can.—Orolo Mfg. Co., Louisville, Ky.

Frey Shield and Goggles

Rain or snow on a windshield prevent the driver from getting a clear vision of the road ahead and render driving dangerous. With this in mind the Frey organization is marketing a shield designed to prevent this difficulty, a visor-like device made of pyralin, a transparent ma-

terial like celluloid, being attached to the windshield by five vacuum cups, which the makers guarantee to hold so firmly that the shield cannot blow off. The shield keeps the rain off the glass, a rubber sealing strip fitting tightly against the glass so that there is no crack where it can leak through. When not in use the shield can be rolled up and stowed away. It sells for $1.50.

A line of two-color goggles is also put out by the Frey concern under the name of Dimmer goggles. These are also made of pyralin which is unlike celluloid in that it is not easily affected by heat and does not give off a disagreeable odor in an excessively warm atmosphere. The goggles are divided, as illustrated, the lower part being of an amber shade while the upper is green or orange. By raising or lowering the head the line of vision may be made to pass through either the upper or the lower portion of the lens. Different color combinations are offered. The goggles are listed at 75 cents.

Another Frey accessory is a paste varnish called Protexacar which is claimed to effectually protect the finish of a car from the deleterious action of water, heat and dirt. When the paste is applied to the surface of the body and chassis it is said to form a hard coating impervious to the elements. It is necessary to renew the coating only once every five or six weeks, as washing of the car does not affect it. Protexacar is applied with a soft cloth and is said to dry instantly. It is put up in ½-lb. cans which are sold for $1 each.—Frey Mfg. Co., Chicago, Ill.

Stull Ford Starter

This starter for Ford cars adds but 18 lb. to the weight of the machine, can be installed without machine work or drilling and does not appreciably interfere with the accessibility of the side of the motor on which it is placed.

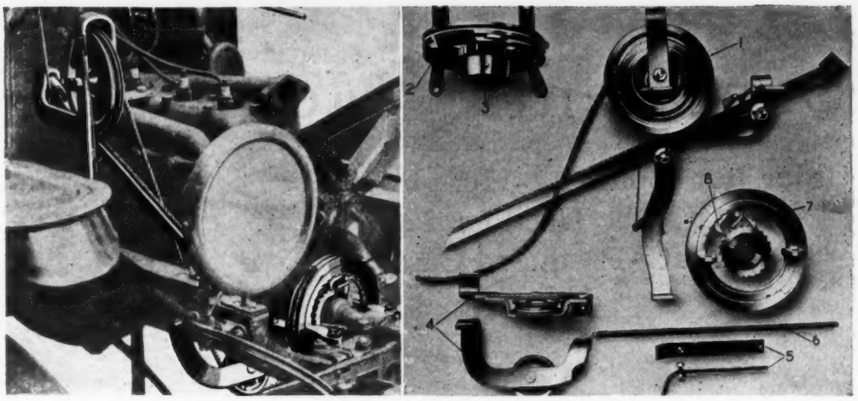
The starter consists of a pedal, projecting through the lower part of the dash just to the right of the coil box, on the end of a plunger rod; a pulley operated by a steel cable attached to the plunger; a smaller pulley integral with the first and carrying a second steel cable which extends over a guide pulley to the front of the motor; and a ratchet mechanism on the crankshaft which imparts motion when the pedal is pushed and which automatically disconnects in case of a backfire.

Referring to the illustration, it will be noted that the plunger rod has attached to its lower end one end of the steel cable that runs over the large pulley 1; the other end is fast to the pulley. The rod is guided by steel rolls running on studs on the bracket. One end of the second steel cable is attached to the smaller of the two integral pulleys, the purpose being to increase the leverage or, in other words, to lower the gear. The other end of this cable is fast to the crankshaft pulley 2. The pulley 4, bracketed at the front of the frame, serves to give the cable a right-angled change of direction. The crankshaft pulley has attached to it a long coiled spring 6, the other end of which is attached to the car frame. This brings the moving parts back to first position, ready for a starting stroke, when the pedal is released.

The final pulley is really a steel ring running on sixty-eight steel balls on a stationary ring which is held against rotation by arms bolted to the crankcase bolts. Attached to the crankshaft and carrying with it a special fan-belt pulley 3, which is part of the outfit, is a ratchet wheel driven by the main pawl 7, on the outer pulley ring. The stationary ring carries the backfiring pawl 8, which automatically releases if the motor kicks back.

As the tendency of the spring is to push the whole system, including the pedal, into starting position, the pedal is held down normally by a little latch projecting through it. Placing the foot on the pedal automatically releases the catch and permits the pedal to rise. A downward push carries two pistons over compression. When the motor is warm this is sufficient, as a rule, to start; but when cold, priming is required for a quick start. The starter is equipped with its own connection for priming the motor from the dash, replacing the original front primer.

The maker states that any first-class mechanic can install the starter in two or three hours. The cowl-dash Fords can be equipped, as well as the straight dash models. Full instructions and blueprint are furnished with each outfit, the whole being packed in a wood box. The price is $15.—Stull Starter Co., Sunbury, Pa. Nelson T. Gutelius, New York City, distributor to the trade.



Left—Stull mechanical starter for Ford cars, illustrating the method of mounting the starter on a Ford motor. Right—Parts of the device, showing simplicity of construction. The system is said to add but 18 lb. to the weight of the car and to be installed without interfering with the accessibility of the motor to any appreciable extent. The starter is actuated by a pedal which connects through steel cables to a ratchet mechanism at the front

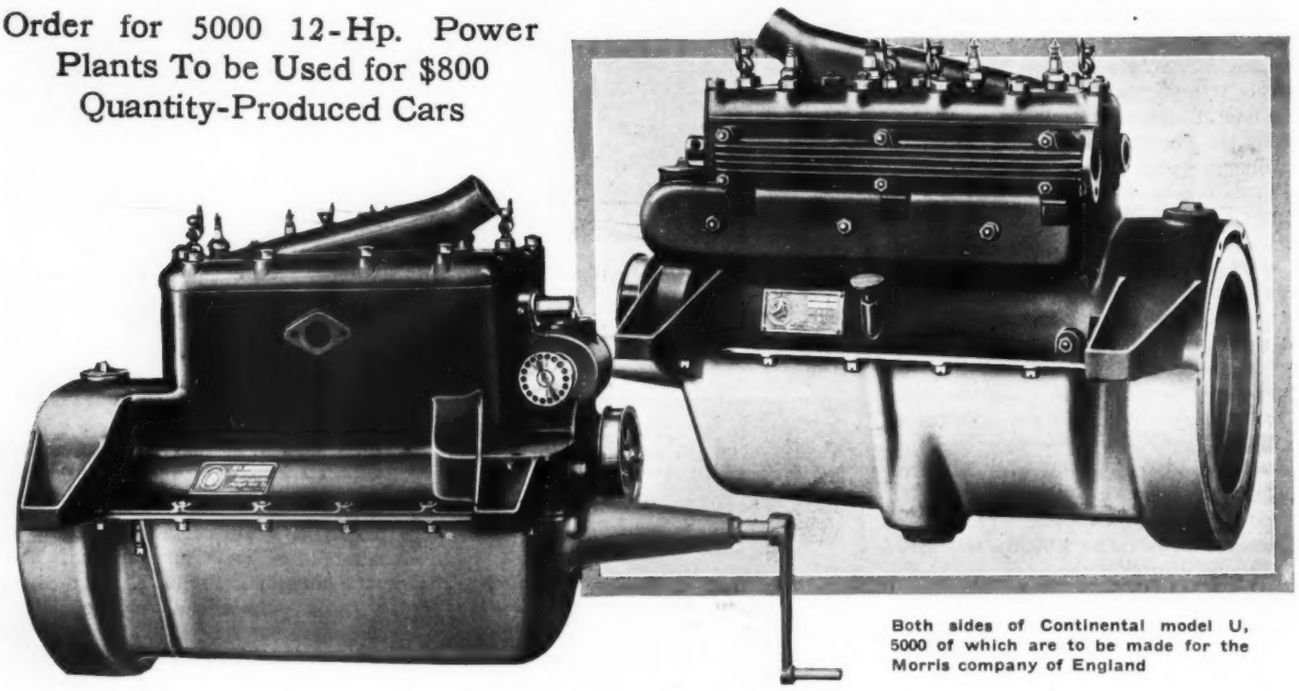
Two views of the new Dimmer goggles made by the Frey Mfg. Co. Upper part is green or orange, while lower is amber

Frey U-Can-C rain shield as it appears mounted on the glass windshield

How the U-Can-C shield keeps the space in front of the driver clear

Continental Motor for British Car

Order for 5000 12-Hp. Power Plants To be Used for $800 Quantity-Produced Cars



Both sides of Continental model U, 5000 of which are to be made for the Morris company of England

DETROIT, MICH., July 20.—What probably marks the entrance of a car manufactured on the American assembly scheme into the English field, is brought out by the announcement of the Continental Motors Mfg. Co., which is to produce a light weight high-speed type of motor of small piston displacement in quantities for the Morris Motor Car Co., Oxford, England. This motor has been primarily designed to meet the European demand for minimum horsepower compensated for by high motor speeds, but may also be found suitable for use by American automobile manufacturers.

The motor is a four-cylinder L-head cast in a block with the cylinders and top half of the crankcase cast integrally. The cylinder head is detachable, permitting access to the valves, pistons and combustion chambers, and the lower structure of the motor is accessible by dropping the bottom half of the crankcase. Four supporting arms are cast upon the crankcase and the rear end is so arranged that a unit power plant could be accommodated, the size of the plant being such as to accommodate several of the standard gearset and clutch units. The bore and stroke are 70 by 102 millimeters or 2¾ by 4 in. This gives a piston displacement of 95 cu. in. and an S. A. E. rating of 12.08 hp. It is stated that the actual brake horsepower developed at 2000 r.p.m. is 18.

Three-Bearing Shafts

Both the crank and camshafts are supported on three bearings, the crankshaft being 1½ in. in diameter. The steels used in these parts is of special composition drop-forged and heat-treated, giving a tensile strength of 90,000 lb. per square inch. Lubrication is by force feed and splash and cooling by thermo-syphon. The carbureter is the side-outlet design bolting directly to a flange on the cylinder casting with the intake passage entirely within the cylinder blocks. The fan is four-bladed and is of steel, being driven from its pulley on the front end of the camshaft. The weight of the motor assembly, exclusive of accessories, is said to be approximately 270 lb.

According to the present understanding, the Morris Motor Car Co. has contracted for 5000 of these motors which will be known as model U. These cars which are to be made during the coming season will be the first assembled British automobile to be produced in any quantity. The car is to be rated at 12 hp. and will sell for about $800 on the other side, although it is stated that a car of similar type could probably be produced and sold in this country for considerably less.

Meeting Arctic Conditions—Buick on Runners

The big sporting event of the year in Nome, Alaska, is the annual sweepstakes race between teams of malamutes and Siberian wolves. The accompanying illustration shows how Jack McQuire took in the finish and the start of the race at Nome, having converted a four-cylinder Buick in that far northern gold camp into an automobile sled, which enabled him to keep up with the contestants throughout the race

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Small Fours Returning

THAT fresh attention is about to be given to the fairly small four-cylinder motor is now certain, and there is little doubt but that we shall see shortly, not one but several, small fours emerging from factories where nothing but the very highest class of work is done. They will be made for quality just as carefully as the largest six or twelve and their price will not be very low, in fact, the cars will be built first and the price made to suit rather than the other way about.

Also it seems more than probable that at least one of the big producers of medium-priced cars will introduce a high-speed four of good quality at about the price now demanded for the average light six, between $1,000 and $1,250.

In making this type of car whether the price is $1,000 or $3,000 light weight will be the greatest consideration and the seating capacity will certainly not exceed five passengers. It is hinted that one car may even be produced at a quite high price with four passengers as the maximum load.

This, of course, is in accord with European practice, since the light, high-speed, four-cylinder motor is only really satisfactory for a reasonable load. With such a load, however, it makes the cheapest possible car to run, for, gasoline and oil efficiencies are very high and tire life in proportion to the light weight. Naturally such a car as a high-priced four will appeal to a certain class of user only, for the man to whom big seating capacity is everything will not find it suitable, but there must be thousands of people to whom a small car of high quality and great durability, good speed ability and the comfort that only costly bodywork can give, will appeal more strongly than larger and less well made chassis.

If things work out as the experiments in progress now indicate it is safe to predict there will be a mild boom in fours once more, the probable ultimate effect being to add a type of car to the American industry's output which will take a permanent place in America, and also be the finest export proposition possible.

Truck Safety

MOTOR truck owners are more than ever convinced that it is good business on their part to actively take up the question of greater safety in connection with the operation of trucks in our larger cities. Efforts on the part of truck owners to improve the safety precautions are not confined to such centers as New York, Chicago and Boston, but have been actively taken up in a score or more of the smaller cities. Experiments made in a Kentucky city last year, with folding rear steps on ice delivery wagons, showed a perceptible reduction in the number of accidents due to children riding on the steps. In New York certain mercantile associations are looking for safety devices and are willing to offer premiums in a few cases for feasible devices. The Fifth Avenue Coach Co. in voluntarily fitting fenders to guard the rear wheels of its coaches is a specific example of how strongly this safety movement has taken hold on our big motor vehicle operators. The coach company is convinced that it is a business investment.

This suggests how imperative it is for our police and traffic departments to better regulate the crossing of streets by pedestrians. It is accepted that pedestrians and vehicles have equal rights on our streets, each having at all times due regard for the safety of others, but it does seem unreasonable to hem the operation of motor vehicles around with restrictions and leave pedestrians free to wander at will to their own destruction.

Weekly Business Reports

THIS week THE AUTOMOBILE publishes the first of its weekly business reports on the condition of the industry not only in manufacturing centers but in many of the largest distributing centers. Our metal markets are reported each week through their respective channels, periodically our banks make public statements, weekly reports on building operations throughout the country are made use of, and it is opportune that the automobile industry is deserving of weekly reports that are carried into every State. The magnitude of the industry is yet not seriously considered by many of our 100,000,000. The time has arrived when the automobile light should not be hidden under a bushel.

300,000 Fords Built in Year

World's Production Record Established—Owners to Receive $15,000,000 in Rebates

DETROIT, MICH., July 16—To-day car No. 300,000 was turned out at Henry Ford's plant. It was not only a record for the Ford Motor Co., but it was the world's record, as no other automobile manufacturer has ever approached such a tremendous output, even in two years or three, not to speak of less than one.

Thus the prophecy that 300,000 Ford cars would be made in the 1915 fiscal year of the company has been realized, and when that fiscal year ends, July 31, the total output will be brought up to about 315,000 cars.

This total is by no means the most the company could make. At the present time the plant is not running to its full capacity, as is always the case when nearing the end of the fiscal year and when about to take its annual inventory.

Incidentally it might be mentioned that the history-making car No. 300,000 bears motor No. 850,938, which would seem to mean that up to that time just that many Ford motors, or Ford cars, have been made.

—

Hunt Packard Chief Engineer

DETROIT, MICH., July 15—O. E. Hunt has been appointed chief engineer of the Packard Motor Car Co. by J. G. Vincent, vice-president of engineering. Mr. Hunt was Mr. Vincent's assistant for several years. There are now over 200 members on the engineering staff of the Packard company, which concern expends from $400,000 to $500,000 annually on development work, it is said.

Graduating at the University of Michigan in 1907, Mr. Hunt followed another profession for two years and then determined to apply himself to the automobile industry. He obtained employment in the Packard drafting room and soon became chief draftsman of the truck department, following which he took over the body department and then became assistant to D. S. Waldon when the latter was vice-president. From this post he acquired the position of assistant chief engineer under J. G. Vincent in which capacity he was acting until his present appointment.

—

Hannibal Truck at $500

HANNIBAL, MO., July 17—N. L. LaBlond, manager of the Hannibal Wagon Co., announced to-day that his company soon would begin the manufacture of a light commercial motor truck the price of which will be in the neighborhood of $500. The new vehicle will be known as the Hannibal truck.

According to Mr. LaBlond, the company has an initial order of 100 trucks, which are to be delivered as fast as they can be put out of the factory. A large extension to the wagon plant at South Tenth and Collier Streets is now being planned.

An engine especially designed for the Hannibal truck is now being manufactured in Detroit, Mr. LaBlond said. The engine will be of 25 hp. and the hauling capacity of the truck will be 1200 lb.

—

Jackson Prices Lower—Two Eights and a Four

DETROIT, MICH., July 19—Three new models, two of them equipped with eight-cylinder engines and the third with a four-cylinder motor, are the 1916 line of the Jackson Automobile Co., Jackson, Mich., these replacing the four- and six-cylinder 1915 models. The eights are in two sizes, the smaller, designated as model 348, having 112-in. wheelbase and selling at $1,195, with 2⅞ by 4¾ in. motor. The larger eight, model 68, is a $1,685 car with seven-passenger body on a 124-in. wheelbase chassis. Its motor is 3½ by 4½. In the four-cylinder model 34 chassis, the motor is 3½ by 5 and the wheelbase is 112. This car is to sell at $985.

These prices are all big reductions for Jackson, as last season's four sold for $1,375 and the six was $1,650.

The motors used are all Northways, and the two eights follow the same general design throughout. The two-cylinder blocks are at 90 deg., and the crankcase is split vertically into two halves, one being integral with each set of cylinders. The four is the standard Northway design with detachable head. The larger eight has a horsepower of 70; that of the smaller eight shows from 45 to 50, and the four develops 38. These powers are all at 2700 r.p.m., and it is evident that the engines are really all of the high-speed type.

Models 34 and 348 have 32 by 4-in. tires, and the 68 is fitted with 34 by 4½.

—

Carter Capital Now $600,000

PONTIAC, MICH., July 17—Notice concerning the decrease of the capital stock of the Cartercar Co. from $650,000 to $600,000 was filed with the county clerk, the document being signed by President Thomas Neal, Secretary T. S. Merrill and Directors Thomas Neal, C. W. Nash, M. J. Murphy and Emory W. Clark. The decision to reduce the capital stock was taken at a recent meeting of the stockholders. It is stated that the amount subscribed after the decision to reduce the capital stock had been taken was $557,720.

Overland's June Shipment 9010

An Increase of 163 Per Cent Over June, 1914—11,400 Men Working at Plant

TOLEDO, OHIO, July 15—The Willys-Overland Co. shipped 9010 cars during the month of June, an increase of 163 per cent over the shipments of June, 1914, when 3298 cars left the Toledo factory. In the first six months of the calendar year the company has shipped almost as many cars as it did during the entire twelve months of 1914, or practically doubled last year's output.

The previous mark was in the month of March, when 7005 cars were shipped. The record shipment for June exceeds these figures by about 30 per cent.

Export shipments, not including Canada, this country having more cars shipped and sold there, so far this year, than during the whole of 1914, were found at the close of June to be fully 70 per cent of the entire export shipments of 1914.

A record was also established in unfilled orders which amounted to 20,000. The present production is about 400 cars a day. Mr. Willys plans to increase this production to 600 cars a day before the expiration of the present season.

The employees number 11,400 and the plant is going at full capacity. Many of the departments are working on a continuous 24-hour schedule, which keeps a night shift of 1500 men busy.

—

Prest-O-Lite to Make Steel Parts

INDIANAPOLIS, IND., July 19—The Prest-O-Lite Co. is preparing to manufacture car parts made out of cold-drawn steel, such as axle housings, cylindrical gasoline tanks, brake drums, etc. At the present time the company has at its local plant one of the largest batteries of presses for drawing steel. The facilities have recently been increased by the addition of some new presses, including one of 800 tons capacity, and the concern is ready to handle work of this kind from blueprints.

—

Prest-O-Lite Sues Sun-Lite

LOUISVILLE, KY., July 16—The Prest-O-Lite Co. has filed an injunction suit and a demand for an accounting of profits in the United States District Court here against the Sun-Lite Gas Co., a corporation of Louisville, Thomas F. Hackett, its president; C. A. Tucker, vice-president; J. J. Moran, manager and Margaret Moran, defendants. In the suit it is claimed the Louisville firm has been refilling Prest-O-Lite tanks.

Retail Car Sales Brisk—Marked Gain Over 1914—Reports from All Sections

New York Sales Heavier in All Classes of Cars—Boston Dealers Exhaust Allotments—Detroit and Indianapolis Factories Rushed—Parts and Accessory Concerns Busy

NEW YORK CITY, July 21—Automobile business throughout the country has during the past week averaged much above that of the corresponding week a year ago. With many of the popular-priced cars listing at under $1000, business has increased 100 per cent as compared with 1914, and in a few cases the demand of buyers has been three times that of a year ago. In the Central West there is a pronounced return of confidence in the financial situation, which is aided by improved road conditions, both potent factors in the purchase of cars.

Boston dealers all report increased trade as compared with the corresponding period a year ago, there not being a single exception. Some are being held up by lack of cars, but in general car shipments are in advance of last year and the business is waiting, dealers in four or five of the largest car producers being nearly two weeks behind in orders.

New York Trade

The New York metropolitan area embracing a population of over 8,000,000 is enjoying vastly improved selling conditions. Overland reports business 300 per cent ahead of a year ago, Ford is 135 per cent ahead, Buick places the increase at 300 per cent and Studebaker at 100 per cent. In the high-priced field Packard reports vastly increased business, Pierce-Arrow is on a par with a year ago and Locomobile has made gains. In the medium-priced field, namely $1000 to $2000, sales have been generally heavier than a year ago. Values in second-hand cars have gone up very materially largely due to the increased demand for new cars.

The Chicago field as representing the Central West has been very active. A few examples will serve to show how the demand has increased; Hupmobile business is double that of a year ago; Chalmers 25 per cent increase; Buick behind in 1916 deliveries; Hudson much in advance of last year.

Boston Market

A detail review of the Boston market as typical of New England shows very general increase in business. In the medium-priced class the well-known cars like Jeffery, Chalmers, Hudson, Velie, Reo, Cadillac, Chandler, etc., have left 1915 behind them and they are on the 1916 path. In the higher priced class the Marmon, Locomobile, Packard and Pierce did better than preceding weeks. The weather was good for sales because it was warm and tended to get people outdoors. The demand for second-hand cars exceeds the supply. And last week a number of people wandered into places looking for used cars and ordered new ones when assured of a speedy delivery.

In the electric car field some of the dealers reported the past week no better or no worse than before. Boston is not a first class electric pleasure car city. But some of the electric truck men said they did better than a year ago. And the hot weather seemed to have started business men into buying trucks, gasoline vehicles, for they made more sales. As a general summary if the dealers all had machines on the floor ready to pass out for cash the sales would have soared away up, for the preceding weeks had been rainy and cold so that motoring was not a pleasure, particularly over the week ends. And what is true of Boston is reflected in other parts of New England.

Indianapolis Makers

Conditions among the automobile manufacturers in Indianapolis are all much superior to those of last year in July.

The National states that its contracts for material and selling contracts provide for the building of 2500 cars for the year ending July 1. Officials state that this number will undoubtedly have to be increased to meet additional demands. The Empire has been kept in full swing throughout the entire spring and summer. The new plant will allow a great increase in production. Business for the season exceeds all other years by 50 per cent. This has been of four-cylinder models. Work has now started on six.

The Pathfinder company is basing its yearly production on 3500 basis of sixes and twelves. From present contracts its models will be very evenly divided. Officials say the sales outlook is wonderful. Hundreds of inquiries were received last week from distributors and contracts received to-day from ten large distributing centers.

Marmon is building cars at 700 capacity, and says that the demand is greater than before with the high spots in New York and Chicago. Say Pacific coast business is also excellent.

Stutz doing capacity business. Building cars in series of 500; expect to build from 1000 to 1500. At present rate of demand they will go over these figures.

Retail and wholesale conditions in St. Louis and territory are the best they have been for twelve years. This territory includes Missouri and parts of Kentucky, Arkansas, Tennessee and Illinois. Overland volume of business was four times that of a year ago during the same week. The distributor is 600 cars behind in delivery. Ford business is 150 to 200 per cent over last year. All dealers are booking heavily 1916 business and lack of cars is the greatest trouble.

Northwest Wants Cars

The practically universal note among Northwestern distributors in Minneapolis is inability to get cars. This condition was not improved last week, and yet orders began to come in for 1916 model deliveries. The new season begins here Aug. 1, but one firm had already sent out 100 new models. In this territory the slack season is July and August, and, somewhat delayed, it is undeniable that this drop is being felt just now. One reason is the unsettlement because of new announcements of models and prices. Another is that at this time the farmer, who is a heavy buyer of motor cars, is turning his attention entirely to his crops.

With this slight turn in the demand for cars one of the most remarkable seasons in Twin City headquarters of automobile concerns was interrupted. The only hindrance to business, apparently, was inability to get cars for the dealers.

In the truck line normal conditions seem to have reversed. Spring business ending at this time has been under expectation and the outlook to-day for fall business is unexcelled, if crops are up to the prospect.

Detroit at Pressure

For the week ending July 17 Detroit had no cessation in the demands of dealers for cars on the one hand, and in the efforts of the manufacturers of cars and parts to keep pace with required production, on the other.

July is proving a busy month. Last week six concerns besides Ford turned out well over 100 cars a day, two of these doing considerably better than twice that number.

Selling conditions throughout the country seem to have been in the best of shape last week. The farmers have been buying many cars, and the feeling seems to be that as the year's crops are among the best we have ever had, there is really more money in circulation in the farming districts than in many years.

With the foreign situation presenting no new or threatening aspects last week, the feeling was generally one of optimism. Prosperous days with the car makers are at once reflected in the activities of the parts people, who practically to a man have all the business they can handle.

Bell Delivery Car by Sept. 1

1200-Lb. Vehicle on Same Chassis as Touring and Roadster Models

YORK, PA., July 19—The Bell Motor Car Co. will have on the market by Sept. 1 a 1200-lb. delivery car. The car will be built on the same chassis as the touring car. There will be two prices with and without electric lights and electric starter. The former figure will be about $775, the price of the touring car and roadster. The delivery car will be equipped with a Bosch magneto instead of the battery-coil ignition system as used on the passenger cars. It will also have a lower gear ratio. The bodies will be built at the plant of the York Body Mfg. Co., operated by the Bell Co.

The first Bell car was completed and appeared on the streets last week. The new Bell car is built in two models, a touring car and a roomy roadster, the price of both being $775. Features of the car are a one-man top, three-point suspension engine, crowned fenders, control levers above steering wheel with horn button in center of wheel, ample body room with pockets in doors, leather-covered instrument board, genuine leather upholstery, Hotchkiss drive, double universal joint, 112-in. wheelbase, demountable rims, weight of the car 2200 lb., 22 miles a gallon of gasoline, Atwater Kent ignition, worm driven from the camshaft, speedometer, rain ventilating windshield, self-starter run by inclosed silent chain. The body of the car will be dark blue, chassis, hood and fenders enameled black.

—

Warren Motor Truck Co. Formed

WARREN, OHIO, July 15—The Warren Motor Truck Co. has been capitalized at $25,000. The stockholders are Warren men who at a meeting elected the following directorate: R. B. Wick, William Wallace, D. L. Helman, R. A. Cobb, C. B. Loveless, G. C. Braden and G. F. Proctor. The directors elected officers as follows: R. B. Wick, president; C. B. Loveless, vice-president; L. L. Jones, secretary; G. C. Braden, treasurer D. M. Bell, general superintendent. The new company has purchased all of the machinery and equipment of the Standard Motor Truck Co. and expects to continue to manufacture trucks in accordance with plans of the former company.

—

New Midget Cyclecar Price $325

SPRINGFIELD, MASS., July 17—The Midget is the name of a new cyclecar that is to be built at Springfield, Mass. C. S. Root and L. E. Bartlett are the men behind it. The car weighs about 600 lb., and will sell for $325. The principal field for it, according to its builders, is in the mail delivery service, a specially constructed body having been designed for it. The motor is a two-cylinder, four-cycle type, and water-cooled. The bore is 3⅜ and the stroke 4 in. The engine develops 12 hp. A. L. A. M. rating. The friction type of transmission is used with three speeds forward and reverse. No axles are used on front or rear as a special arrangement of the springs does away with both. The wheelbase is 102 in. and the tread is 36 in.

—

Kelly-Springfield Adds Four New Trucks

SPRINGFIELD, OHIO, July 16—According to the plans of the Kelly-Springfield Motor Truck Co., this city, four new vehicles will be added to the line of Kelly trucks. This brings the Kelly line up to seven vehicles ranging in capacity from 1 to 6 tons. The new vehicles known as K-31, K-35, K-45 and K-60 are 1½, 2, 4 and 6 ton. In the two smaller the K-30 motor is used, which is the same as that formerly employed on the 1-ton model, and on the larger two the K-40 model motor is used, which is the same as that employed on the former 3½- and 5-ton models. Improvements have been made, but no radical changes are noted, the carbureter is now the Rayfield and the motor has the lower part of the crankcase cast in two parts.

—

McGookin Leaves Stewart-Warner to Join Springfield Body

DETROIT, MICH., July 17—Earl McGookin, who has been connected with the Stewart-Warner Speedometer Corp. of Chicago, for the last 12 years, and has been in Detroit during the past 7 years, being manager of the local branch, has resigned and will leave Aug. 1. At that time Mr. McGookin will become identified with the Springfield Metal Body Co., Springfield, Mass., which will establish a plant here in Detroit, for production business, exclusively. Mr. McGookin has purchased an interest in the Springfield concern and with him in the new plant there will be associated Joseph Boyer, Jr., and W. T. Fry. It will be several months probably before the local plant will be in operation. Five factories have thus far signed contracts and will be taken care of by the new local plant, the Paige-Detroit Motor Car Co.; the Maxwell Motor Co. and the Chandler Motor Car Co. being among these concerns.

S. A. Douglass will succeed Mr. McGookin as manager of the Detroit branch of the Stewart-Warner Speedometer Corp.

Must Abandon Credit System

American Manufacturers Must Learn to Risk Their Pay in S. A.

DETROIT, MICH., July 16—Until the American manufacturer is willing to forget the credit system and take a chance on his pay, American-made goods will not find a ready market in South America.

This is the opinion of Peter Steenstrup, who recently returned from an eight months' trip to Central America, the West Indies and South America in the interests of the Hupp Motor Car Co. Mr. Steenstrup last fall told Detroit manufacturers trade with South America would not prove a "gold mine" because of the war in Europe and he has returned from another trip below the equator convinced that the war has served to make it harder to establish commercial relations with the Latin-American countries.

How Manufacturers Err

"The war destroyed three things most necessary for the South American trade," said Mr. Steenstrup. "It took away the credit of the countries, the ships for bringing them goods, and deprived them of a chance to get products at the terms necessary for their business. Manufacturers in this country attempt to do business with the Spanish merchants on the same basis as they do with local dealers whose credit is established. Where the manufacturer demands gilt-edge security before he will ship an order, the Spanish merchant expects from three to nine months' credit. He is forced to sell the goods before he can pay for them.

"There is no Bradstreet or Dun in South America outside of one or two big cities. Such business cannot exist because the merchant considers inquiry as to his credit as an insult. The Spanish are honest, but they demand that they do business in their own way.

Chance for United States

"Study of the conditions of the people and country made the German and English successful in South America. The United States has the same chance, but she must start twenty years back and attack the problem in the same way. The English even now are selling goods in South America and are making a play for the business from the countries.

"It takes a salesman of tact and patience to do business in those countries. He must be willing to await the pleasure of the merchant and he must sell him what he wants to buy, not what the

salesman thinks he ought to purchase.

"When the wave of 'sell to South America' swept the country last fall, a good many merchants imagined they could dispose of products with ease. This cannot be done, because what we call necessities up here are luxuries in the tropics.

"The retarded civilization of the countries eliminates a large number of products that have a steady demand in this country. Cotton goods is the most universally required article in South America, and England seems able to negotiate that trade.

"Another reason that retards trade at this time is the fluctuation of the currency of the countries. In some of them the exchange rate for United States money is getting higher all the time. Merchants hesitate to buy on that account, fearing that by the time that they pay for the goods their currency will have dropped lower in its relation to our money.

"What the United States exporter needs is an understanding of conditions. He needs salesmen who know the country, and above all he needs the grit to tide him over a period of loss before he can build up a paying trade."

—

Marion and Imperial to Be Marketed by Mutual Motors

JACKSON, MICH., July 17—The Mutual Motors Co., this city, has acquired the exclusive sales right, good will, trade name, etc., of both the Marion and the Imperial cars and will hereafter market both of these through individual and separate departments of its own company instead of as heretofore through separate selling corporations.

The Mutual Motors Co. has heretofore confined its program to the manufacture of Imperial cars for the Imperial Automobile Co. and Marion cars for the Marion Motor Co., all of Jackson, Mich.

The Mutual company does not take over any of the physical assets or assume any of the obligations of either of the other two companies but has simply acquired the sole selling rights of both.

The Mutual will continue the manufacture of both lines, the Imperial line consisting of the Four which heretofore listed at $1,085 but listing now at $995 and the Six which heretofore listed at $1,285 but now listing at $1,185.

The Marion Light Six will continue as heretofore, but at a new list price of $1,185 instead of $1,250 as formerly.

The taking over of the sales ends by the Mutual Motors Co. does not in any way affect the field and dealer organizations of either line. In other words the Mutual will go right along supplying Imperial cars to Imperial dealers and Marion cars to Marion dealers just as the respective selling companies have done in the past.

Electric System on 1916 Monroe

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Standard at $495 Instead of Extra—Refinements Only Changes in Car

FLINT, MICH., July 16—The 1916 Monroe car is now out and is being exhibited in many of the branch distributing agencies of the company. The car shows very little change from last year except for a few refinements and the fact that the electric lighting and starting are now standard at the purchase price of $495, whereas for 1915 they were extra equipment. It is featured by a streamline body, left drive, center control and full equipment including top, windshield, etc.

The car has a block motor with valves in the head, the 3 by 3.75 power plant delivering the drive through a 10.5-in. clutch to a three-speed gearset. Cooling is by thermo-syphon and the radiator is supplied with an auxiliary tank at the top. Lubrication is by a combination splash and pressure system. The oil is taken by pump to the connecting-rod, main bearings and timing gears. Nickel steel gears are used and the shifting lever is mounted directly at the rear of the gearbox, providing a direct control without intermediate linkage. The rear axle is semi-floating and torque is taken through a tube connected to the rear end of the gearbox by a forked yoke. The control instrument set is mounted on the cowl board.

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Michelin Reduces All Tire Prices 10 Per Cent

NEW YORK CITY, July 20—A price reduction of 10 per cent, effective July 19, has been declared by the Michelin Tire Co., Milltown, N. J. The reduction covers the entire line. The old and the new figures on some of the more popular sizes of tires are given here:

Size	Old Price	New Price
30 x 3	$11.50	$10.40
30 x 3½	15.70	14.14
32 x 3½	18.00	16.25
34 x 4	24.50	22.00
36 x 4	26.25	23.75
36 x 4½	31.75	29.25

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Heinze to Make Electric Starter

DETROIT, MICH., July 20—John O. Heinze, for nearly 5 years chief engineer of the Northway Motor & Mfg. Co., has resigned to go back into electrical work, having organized the J. O. Heinze Co., at Springfield, Ohio, to manufacture electric starters and other electrical apparatuses for automobiles.

Wm. Pflum, former manager of the National Cash Register Co. and later head of the Wagenhals Motor Co., and A. S. Knoblock, general manager of the Northway company are among those associated with Mr. Heinze in the new enterprise, which also includes some of the business men of Springfield and Dayton, Ohio. The new company is already incorporated for $500,000.

A new concrete plant has been secured at Springfield and Mr. Heinze states that the apparatus is to be manufactured completely, everything is to be carried on with the view of a high grade quantity output, 50,000 starters being planned for the first year with a working force of 350. Details of the starter design and of other apparatus will be forthcoming later.

—

Premier Company May Move Plant to St. Paul

MINNEAPOLIS, MINN., July 17—Frank E. Smith, of the Premier Motor Mfg. Co., Indianapolis, is here, looking over the ground for a factory site. He met a committee of the St. Paul Commercial Club.

INDIANAPOLIS, IND., July 20—*Special Telegram*—Upon his return from St. Paul, Minn., Frank E. Smith, trustee of the Premier Motor Mfg. Co., stated that the Premier company was seriously considering moving its entire establishment to St. Paul.

The rumor that a movement was under way has been persistently denied by the Premier company until to-day. Mr. Smith stated that St. Paul capitalists had made an attractive offer for the taking over of the company through the St. Paul Chamber of Commerce.

Mr. Smith would not make public any details, but said that the deal may be completed in thirty days. While he would make no statement as to the inducement offered at St. Paul it is believed that a site and buildings are included. Although Mr. Smith will not admit as much it is generally believed that the deal is all but closed.

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Indiana S. A. E. Postpones to Sept. 24

INDIANAPOLIS, IND., July 17—A change in date and some added features is the latest news in regard to the opening meeting of the Indiana section of the Society of Automobile Engineers. The meeting was announced for Sept. 17, but it has been made a week later which will be Sept. 24. J. G. Vincent will be the main speaker of the evening, discussing twelve-cylinder.

J. E. Diamond, engineer of the Aluminum Casting Co., Detroit, will make an address on aluminum, while Mr. Vincent's address will be entitled, "Modern Tendencies in Motor Design" and will deal with the twelve-cylinder motor. Mr. Diamond's subject will be "Aluminum Pistons," very closely related to the twelve-cylinder subject.

21,826 Cars and Trucks in Colorado

Registrations During First Six Months of 1915 Show Increase of 5000 Cars, or 30 Per Cent Over Same Period Last Year, and 3395 More Than 1914 Total—Registrations Analyzed

By H. G. Hedden

DENVER, COL., July 15—A total of 21,828 automobiles, representing 197 different makes, is Colorado's registration for the first six months of 1915. This is a gain of more than 5000 cars, or 30 per cent over the same period last year, and a gain of 3395 cars, or 18 per cent, over the total registration for 1914, which was 18,433.

Besides heavy sales this year, two other factors are named by Secretary of State Ramer as helping strongly toward this increase. One was the system adopted by the retiring Secretary of State of starting the 1915 registration on the first of December instead of waiting till January, which was followed by Secretary Ramer with rigid insistence upon prompt registration throughout the state. The other has been Secretary Ramer's introduction of a license inspection system, which has brought in a large number of delinquents. In addition to these influences, extensive road improvements throughout the state and an earlier opening of the roads in general from snow and other hindrances to travel have played a part worth mentioning. Good

Colorado 1915 Motor Car Registration by Make

Make	Denver	Outside Counties	Total
Apperson	47	63	110
Ardsley	1	0	1
American	12	8	20
Avery	1	1	2
Abborn	1	0	1
Atterbury	1	0	1
Aero Car	2	5	7
Anderson	1	1	2
Atlas	1	0	1
Arbenz	1	0	1
Argo	0	1	1
Amplex	0	1	1
*American La France	0	1	1
Abbott-Detroit	72	69	141
*Autocar	14	4	18
Adams	0	1	1
Alco	3	4	7
Auburn	0	12	12
Babcock	5	2	7
†Baker	107	30	137
Buda	1	0	1
Benz	1	0	1
Buffalo	3	0	3
Buick	323	1266	1589
Brockway	11	0	11
Brush	22	77	99
Briscoe	2	17	19
*Best	0	3	3
Briggs-Detroiter	13	14	27
Bendix	0	1	1
Byron	1	0	1
Crawford	4	2	6
Clark	3	0	3
*Chase	27	21	48
Cartercar	26	68	94
Columbia	50	7	57
Cole	32	34	66
Colby	1	0	1
Corbin	3	2	5
Continental	7	1	8
*Commerce	20	5	25
†Chicago	1	0	1
Cadillac	330	428	758
Colburn	14	5	19
Case	16	82	98
Chalmers	198	235	433
Cunningham	5	0	5
Carnation	0	1	1
Cutting	1	4	5
Columbus	78	17	95
Courier	5	7	12
Crow	1	7	8
Columbus Buggy	0	1	1
Chandler	5	11	16
Chevrolet	60	54	114
Capitol	6	0	6
Croxton	6	0	6
Crescent	0	1	1
Cameron	0	2	2
Dodge	83	107	190
Dorris	31	14	45
Dolson	1	0	1
Davis	1	0	1
Dermot	1	0	1
Dort	3	1	4
†Detroit	59	17	76
Economy	0	2	2
Evans	0	1	1
Enger	0	1	1
Elmore	12	10	22
Everitt	40	41	81
Empire	12	10	22
Frayer-Miller	6	0	6
Ford	2132	6286	8418
Fuller	2	2	4
Fiat	4	1	5
†Fritchle	146	14	160
Flintlow	0	1	1
Firestone-Columbus	0	1	1
Flanders	54	93	147
*Federal	6	2	8
Franklin	94	92	186
French	0	1	1
*Grabowsky	2	1	3
Great Eagle	2	0	2
Great Smith	0	13	13
Great Western	1	2	3
*G. M. C.	5	3	8
Gleason	2	7	9
Garford	5	1	6
General	17	0	17
*Gramm	4	3	7
Gale	0	1	1
Grant	4	13	17
Glide	1	4	5
Galloway	0	2	2
Havers	1	2	3
Holsman	0	2	2
Hupmobile	91	210	301
†Hupp-Yeats	11	10	21
Henderson	5	4	9
Halladay	4	3	7
Haynes	31	32	63
Henry	0	2	2
Herff-Brooks	0	1	1
Hercules	0	7	7
*Hartford	0	1	1
Herreshoff	0	1	1
Harley	0	1	1
Howard	0	1	1
*H-D	0	1	1
Hudson	93	124	217
Inter-State	38	25	63
*International	15	31	46
Imp	7	3	10
*I. H. C.	3	34	37
Imperial	3	17	20
Jackson	34	37	71
Jeffery	9	31	40
King	3	1	4
Kissel	20	27	47
Knox	1	1	2
Kline	0	1	1
Krit	18	19	37
Lion	0	2	2
Lambert	2	16	18
Lexington	1	2	3
Little	10	3	13
‡Lane	1	0	1
*Little Giant	4	4	8
Lozier	36	34	70
Locomobile	21	11	32
Monroe	3	3	6
Marion	22	22	44
Middleby	0	1	1
*Kelly	5	0	5
Marathon	2	5	7
*Mack	5	5	10
Mora	2	1	3
Maxwell	415	499	914
Moon	9	20	29
Mason	3	0	3
*Modern	0	1	1
Mitchell	63	75	138
Mercer	2	1	3
Monarch	2	0	2
Marmon	4	5	9
McIntyre	2	3	5
Metzger	1	0	1
Modoc	1	1	2
Maxwell-Briscoe	0	3	3
Mercedes	1	0	1
Midland	1	4	5
Moline	3	4	7
McFarland	1	1	2
Mayer	1	0	1
Maytag	0	4	4
Matheson	0	1	1
Metz	79	183	262
Michigan	24	39	63
National	17	14	31
Norwalk	0	1	1
Northern	1	3	4
Nyberg	0	1	1
Owen	0	1	1
Oakland	58	82	137
Orient	1	1	2
Ohio	48	5	53
Overland	468	1067	1535
Oldsmobile	66	70	136
Packard	82	50	132
Pilain	0	1	1
Palmer-Singer	3	5	8
Pratt	0	11	11
Pilot	6	6	12
Pullman	5	1	6
Parry	4	7	11
Pierce-Racine	1	0	1
Pioneer	0	1	1
Peerless	35	19	54
Paterson	2	1	3
Pope-Toledo	0	1	1
Pierce-Arrow	114	39	153
Partin-Palmer	0	1	1
Pathfinder	8	5	13
Pope-Hartford	4	14	18
Petrel	0	5	5
Panhard	0	1	1
Pennsylvania	1	0	1
Paige	33	97	130
Pope	4	0	4
Premier	10	8	18
Queen	0	1	1
Renault	7	2	9
*Randolph	5	3	8
*Rapid	24	7	31
Reo	116	339	455
Rider-Lewis	0	1	1
R. C. H.	26	20	46
†Rauch & Lang	29	9	38
Rockway	0	1	1
Rocket	0	1	1
Royal Tourist	0	2	2
Regal	27	63	90
Rochet-Schneider	0	1	1
Rambler	26	53	79
*Reliance	1	0	1
Ricketts	1	0	1
Stevens-Duryea	80	33	113
*Sampson	5	1	6
Stanton	0	1	1
‡Stanley	64	105	169
Stafford	0	1	1
Staver	2	3	5
Smith	14	0	14
Studebaker	324	633	959
E. M. F.	64	251	315
Stoddard-Dayton	37	55	92
Speedwell	1	3	4
Simplex	0	1	1
Siegler Wade	0	1	1
Stutz	3	4	7
*Sterling	0	2	2
Sears	0	8	8
Sears-Roebuck Buggy	0	1	1
Selden	1	2	3
Saxon	10	30	40
*Saurer	1	3	4
Savoy	0	1	1
Schacht	1	4	5
*Seitz	1	0	1
Stearns	9	5	14
Thomas	37	23	60
Twombly	0	1	1
Trumbull	0	2	2
*Vulcan	1	3	4
Van Dyke	0	1	1
Velie	14	79	93
Victor	2	0	2
Victoria	3	0	3
Warren	3	6	9
Winton	30	26	56
†Waverley	48	5	53
Waltham	1	0	1
*Utility	0	5	5
*Walker	1	1	2
Woods	2	3	5
*Wilcox	1	0	1
Welch	1	4	5
Westcott	2	4	6
White	26	44	70
Wayne	3	6	9
*Wichita	4	3	7
Winters	0	1	1
*Whiting	3	0	3
Whitaw	1	0	1
Yeager	1	0	1
Zip	2	5	7
Zimmerman	0	1	1

*Commercial vehicle. †Electric machine. ‡Steam

crops last year and good prospects for this year have greatly helped along the sales feature.

Denver Has 6705

Of the total number of cars in the state shown by the June 1 returns, 6705 were registered from Denver and 15,123 from the outside counties. Denver's increase is 585 cars above the total of 6120 for last year, or a gain of nearly 10 per cent.

With the prominent exception of Mesa County, on the western border, the eastern part of the State shows the main bulk of the increase. Mesa County has 396 cars for this year as against 316 for 1914, or an increase of 26 per cent.

Among the eastern counties leading in the gain are Arapahoe, joining Denver on the south, with a gain of from 210 to 346, or 64 per cent; Weld, two counties north of Denver, showing 1170 to 1430, or a gain of 22 per cent; Phillips, near the northeastern corner, with 220 to 162, or a gain of 35 per cent; and Baca, in the extreme southeastern corner, with a jump of 37 to 166, or a 348 per cent gain.

The only county not reporting any cars since the new state motor vehicle law went into effect two years ago is Dolores, in the extreme southwestern corner of the state, a thinly-settled, mountainous county. San Juan, also in the mountains and at an altitude where the snow stays on late, has not reported any registration so far this year, but reported three cars late in 1914. Some of the mountain sections have shown a pleasing increase, which is thought to be due in part to a substantial growth in the metal mining industry in the last year or two.

Classified according to style of car, horsepower rating and kind of motive power, the registration is as follows:

Class	Denver	Outside Counties	Total
Gasoline cars to 25 hp.	3,061	8,699	11,760
Gasoline cars above 25 hp.	2,495	5,495	7,990
Electric passenger cars	493	189	682
Steamers	64	105	169
Gasoline trucks	308	79	387
Electric trucks	33	4	37
Dealers' cars	251	552	803
	6,705	15,123	21,828

Total gasoline pleasure cars, classified: Denver, 5556; outside counties, 14,194; entire state, 19,750.

Of the 197 different makes represented in the state, the leading six rank as follows:

Make	Denver	Outside Counties	Total
Ford	2,132	6,286	8,418
Buick	323	1,266	1,589
Overland	468	1,076	1,544
Studebaker	324	635	959
Maxwell	415	499	914
Cadillac	330	428	758

Besides the regular Studebaker, there are also 315 registered as E. M. F., sixty-four being in Denver and 251 outside.

Secretary Ramer estimates that the total registration for 1915 will come close to 28,000, which will be an increase of 50 per cent over last year. He estimates that the total revenue for 1915 from all motor vehicles and drivers' licenses will be approximately $125,000, as against $80,000 in 1914. More than $100,000 of this will probably be available for road work through the state and county highway funds, the net motor vehicle license revenue being divided equally between the state highway fund and the road funds of the respective sixty-two outside counties individually in proportion to the fees collected by each county. Last year the net amount so divided for road work was $76,600.

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King Adds Three-Passenger

DETROIT, MICH., July 20—In response to a demand for roadsters, the King Motor Car Co. has added a three-passenger body mounted upon the eight-cylinder chassis, which has a wheelbase of 113 in. The roadster sells for $1,350, the same as the touring car.

Improvements have been made in the chassis itself, the bore having been increased from 2¾ to 2⅞ in. and to accommodate the larger volume of gas, the valve ports have been increased in size and a larger intake manifold fitted with an improved type of Zenith carbureter.

Roominess has been made a feature in the roadster, some of the principal dimensions being: dash to front seat, 20½ in.; floor to top of cushions 13 in.; thickness of cushions 8 in.; width of seat, 43 in.; front of seat to back, 18 in.; top of cushion to top of back seat, 19 in. Tires are 33 by 4 non-skid on the rear with one extra rim as part of the regular equipment.

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Brush to Assist Scripps-Booth

DETROIT, MICH., July 20—Alanson P. Brush, of the Brush Engineering Association, has been retained as consulting engineer for the Scripps-Booth Co. on its 1916 models. W. B. Stout, chief engineer, also receives the added title of advertising manager of the Scripps-Booth concern, to take effect Aug. 1.

By these changes the position of the Scripps-Booth Co. in its unique field of design is further strengthened. Mr. Brush is well known in engineering circles, and his automobile experience dates back to his designing work on the single cylinder Oldsmobile and Cadillac cars. He also has consulting connections with Moline and Ferro companies.

Bay State Fees Over $1,000,000

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83,868 Cars and Trucks Registered—Gain of 27.5 Per Cent Over 1914

BOSTON, MASS., July 17—Massachusetts automobilists have poured into the state coffers more than $1,000,000 for the first six months of this year, and the registration figures will exceed 100,000 for the year without any doubt. Even now with the year half gone it takes at least half an hour to get a car registered at the Highway Commission's headquarters, and every day there is a line extending out into the hallway waiting to get numbers. For the first six months of 1915 there were 83,868 machines registered in the Bay State. That was an increase of 19,252 over the same period of 1914, and it is 6652 more than had been listed for the entire year of 1914. About $200,000 more than was gathered in for the first six months of last year has been taken in for the same period this year, and it is about $34,000 more than was secured for the full year of 1914. Before the season ends it is expected that at least $1,250,000 will be paid the state by motorists.

The increase shows an average of 27.5 per cent above the figures of last year, a very big gain which shows that New England is prosperous. The number of people securing driver's licenses is jumping rapidly until now about one in every twenty-six Massachusetts residents is allowed to drive a car. This increase is about 27 per cent, and when the year ends about 125,000 licenses will be in the hands of Bay State operators. The trucks have gained faster than cars. The dealer class, too, shows a good gain, there being 1653 registered so far this year to 1145 for the same period a year ago.

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Kentucky Gains 3743 Cars

LOUISVILLE, KY., July 16—According to Hugh Ramsey, deputy commissioner of motor vehicles, 15,500 automobiles are now registered in the State of Kentucky, a gain of 3743 since Jan. 1, 1915, when the official records showed the registration to be 11,757. It is predicted that a total of more than 22,000 cars will be registered by Dec. 31.

Massachusetts Registrations for 1914 and 1915

	Jan. 1 to July 1, 1914	Entire Year, 1914	Jan. 1 to July 1, 1915
Motor vehicles, all types	64,616	77,246	83,868
Trucks	9,900	6,950	8,236
Motorcycles	6,359	8,161	7,704
Manufacturers and dealers	1,445	1,518	1,653
Licenses, operators and chauffeurs	14,319	26,858	23,649
Renewals, operators and chauffeurs	43,418	72,674	49,443
Examinations	3,885	7,497	5,317
Receipts	$781,965.35	$965,669.59	$999,524.90

National Rubber to Move Plant

Work Begun on 1000 Ft. Structure in Williamsburg, Pa.—Efficient Layout

WILLIAMSBURG, PA., July 19—The National Rubber Co., with factory and main offices now in Pottstown, Pa., broke ground here to-day for the model daylight factory which the company plans to have completed and in actual operation by Jan. 1.

Since the first of the year the business of this company has increased so rapidly that its factory facilities in Pottstown are no longer adequate to meet the demand. Rather than attempt to build additions to the present plant, it was decided to build an entirely new and model factory which would be able to turn out at least 1000 tires and tubes a day.

The National people have been quietly looking for a desirable location for over two months and after looking over the offers and advantages offered by 150 different cities finally decided upon Williamsburg because of its natural advantages.

Ten acres of ground which was found suitable were secured on a railroad siding and next to the Blue Juniata River from which it will be possible to obtain free water and power—two important items for a rubber factory.

The factory is laid out to secure the highest possible efficiency in manufacturing. The main building is to be 1000 ft. long and 65 ft. wide and one story high. The construction is of Ponds continuous steel sash throughout, insuring perfect natural light and ventilation. There will not be a pillar or post in the entire 65,000 ft. of floorspace.

It is planned to have all the machinery independently driven by electricity in order to eliminate all overhead belting and shafting, the factory being arranged so that the raw material will be received at one end of the building and from there travel through the long structure without once moving backward or requiring any duplicate handling.

In addition to the main building there will be separate buildings for the powerhouse, the machine shop and the office building. The powerhouse is to measure 40 by 40, the machine shop 65 by 120 and the office building 50 by 50.

The factory in Pottstown will continue in operation until the new factory is completed. The machinery will then be moved to Williamsburg and operations resumed, it is hoped, within a week after leaving the old factory. Considerable new machinery is to be purchased.

The National Rubber Co. is incorporated for $2,500,000 and employs over 200 men.

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$1,000,000 Plant for Overland in St. Paul

ST. PAUL, MINN., July 15—The Willys-Overland Co., Toledo, Ohio, will erect a branch factory office building, warehouse and storage yards in St. Paul, costing $1,000,000. Work will begin in the near future on the plant on University Avenue, adjoining the Illinois Steel Co. plant.

The company has frontage of about 500 ft., with ample room for expansion. The plant here will assemble and ship cars to all Overland agencies west as far as the Pacific Coast. The plant will employ about 5000 people.

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Metal Prices Lower

NEW YORK CITY, July 20—With the exception of metal prices, quotations in the markets this week remained unchanged. Lead, tin, electrolytic copper and antimony, were lower. Lead dropped to $5.55 a 100-lb. on Friday and held at that price until the closing on Monday. The metal is being freely offered at that price, but the buyers are looking forward to a continuation of the downward movement and are not taking much metal. The tin market prices fluctuated last week, the highest mark being $38 on Tuesday. The market continues its downward course under the pressure of the weak and heavy markets at London and the Straits. Electrolytic copper showed a fractional loss and it is predicted that a further reduction may take place.

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1916 Allen Price $795

FOSTORIA, OHIO, July 21—The Allen Motor Co., this city, has announced the Allen "37" for 1916 selling at $795, the same price applying to both the roadster and the touring car. The 3¾ by 5-in. motor develops 37 hp. The motor is long stroke and is made by the Sommer Motor Co., Bucyrus.

Other features are Stromberg carbureter, Westinghouse electric system for starting, lighting and ignition, Stewart-Warner vacuum fuel feed system with tank hung at rear, full floating rear axle, pressed steel housing, 12-in. brakes with pressure equalizers, 55-in. long underslung rear springs, 112-in. wheelbase, 32-in. wheels, and a one-man top.

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No Goodrich Common Dividend

NEW YORK CITY, July 15—Despite the fact that earnings of the B. F. Goodrich Co. are expected in some quarters to show at the rate of 10 per cent for the common stock, it is stated that officers of the company will recommend at this month's meeting of the directors, July 28, that no dividend be declared on the common stock. The company intends to build up an immense surplus before dividends are resumed.

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Buys Entire Havers Factory Stock

CLEVELAND, OHIO, July 15—R. C. McLean, president of the M. & M. Co., 480-500 Prospect Avenue, has purchased the entire stock and equipment of the Havers Motor Car Co., Port Huron, Mich., from the receivers.

Mr. McLean is preparing to put the entire equipment and stock on sale at his warehouse, 515 Huron Road.

—

Racine Co. Files Petition

RACINE, WIS., July 15—The Racine Drop Forge Co., this city, filed a voluntary petition in bankruptcy on July 17, admitting liabilities of $9,462 and assets of $3,553. The concern was identified with the motor and car industry and transacted practically all of its business in this line.

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National Spring & Wire Adds

ALBION, MICH., July 16—About $100,000 is to be spent by the National Spring & Wire Co., manufacturer of seat springs, in enlarging its plants here and

Daily Market Reports for the Past Week

Material.	Tues.	Wed.	Thurs.	Fri.	Sat.	Mon.	Week's Changes
Aluminum	.31	.31	.31	.31	.31	.31	.....
Antimony	.36	.35½	.35½	.35½	.35½	.35½	—.00½
Beams & Channels, 100 lbs.	1.31	1.31	1.31	1.31	1.36	1.36	+.05
Bessemer Steel, ton	19.50	19.50	20.00	20.00	20.00	20.00	.....
Copper, Elec., lb.	.19½	.19⅜	.19¼	.19¼	.19¼	.19¼	—.00¼
Copper, Lake, lb.	.19½	.19¾	.19¾	.19¾	.19¾	.19¾	+.00¼
Cottonseed Oil, bbl.	6.01	5.96	6.00	5.99	6.00	6.01	.....
Cyanide Potash, lb.	.24	.24	.24	.24	.24	.24	.....
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	.....
Gasoline, Auto, bbl.	.12	.12	.12	.12	.12	.12	.....
Lard Oil, prime	.90	.90	.90	.90	.90	.90	.....
Lead, 100 lbs.	5.70	5.60	5.60	5.55	5.55	5.55	—.15
Linseed Oil	.57	.57	.57	.57	.57	.57	.....
Open-Hearth Steel, ton	20.50	20.50	21.00	21.00	21.00	21.00	.....
Petroleum, bbl., Kans., crude	.40	.40	.40	.40	.40	.40	.....
Petroleum, bbl., Pa., crude	1.35	1.35	1.35	1.35	1.35	1.35	.....
Rapeseed Oil, refined	.77	.77	.77	.77	.77	.77	.....
Rubber, Fine Up-River, Para	.62	.62	.62	.62	.62	.62	.....
Silk, raw, Ital.	3.75	..	3.75	..	..	3.75	.....
Silk, raw, Japan	3.37½	..	3.37½	..	..	3.37½	.....
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	38.00	37.75	37.50	37.50	37.63	37.13	—.87
Tire Scrap	.04¾	.04¾	.04⅜	.04¾	.04¾	.04¾	.....

in Windsor, Canada. The additions to the local plant will consist of a two-story building, 294 by 60 ft., which will be an enlargement of the machine shop. A small section of the new structure will be only one-story high and will be used for enameling ovens and dip-room. Another addition, 146 ft. long now nearly completed, will include the new offices and tool rooms. A new building recently completed as a storeroom, will be fitted with machinery and become a part of the machine shops.

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Great Western Enters Six Field

PERU, IND., July 20—The Great Western Automobile Co., this city, which has for years been manufacturing a four-cylinder car, has entered the ranks of the six-cylinder builders. Fitted with a five-passenger body and mounted on a chassis of 118-in. wheelbase, the new car sells for $1,185 f.o.b. Peru. It is provided with a 3- by 5-in. power plant and is featured by a body of streamline design with divided front seats and roomy tonneau. It is low-hung and has adequate storage space. Curtains are Jiffy, secured to the bows of the one-man top.

The tool box and battery box are under a hinged door in the floor in front of the driver's seat, allowing the driver to reach any of the tools without disturbing the passengers. Luggage compartments are placed under the tonneau floor, there being two, each large enough for two suit cases. The gasoline tank is in the rear along with the tire carrier which is patented, it being necessary to loosen but one screw to remove the rim and tire.

Securities Markets Strong

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General Motors Common Gains 32 Points on Dividend Rumor —Overland Another Feature

NEW YORK CITY, July 19—Securities closed on Saturday with some very substantial gains. The market as a whole showed a most remarkable advance, considering the fact that a big reaction was expected. Firestone common is now quoting at between 506 and 512, approximately 300 points higher than this time last year and General Motors common, which showed a record gain of 32 points last week, has shown a 100 per cent gain since last July.

Willys-Overland common and preferred gained 14 and 1½ points on the strength of the new Willys-Knight announcement. International Motors came to the fore again Saturday when its common rose to 17 and its preferred to 43, respective gains of 4½ and 8 points.

Tire issues, with the exception of Firestone, were not so prominent last week. All three Kelly-Springfield issues showed drops and U. S. Rubber preferred also showed a decline. Goodrich preferred made a slight gain of 1-2 point.

The Detroit issues were steady with a few gains. General Motors common showed a 32½-point gain, in sympathy with the Wall Street prices. Its preferred went 3¼ points. The rest of the changes ranged in gains from 1 to 3¾ points. In the inactive stocks, the only change that occurred was that of Canadian Ford, which was 75 points.

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Pope's Westfield Plant Sold

HARTFORD, CONN., July 21—*Special Telegram*—The Westfield plant of the Pope Mfg. Co. was sold at public auction Tuesday afternoon to H. Preston Coursen of New York, representing Wilbur C. Walker of the Hartford Motor Car Co. and a former officer of the Pope company, and Scott McLanahan of New York for $725,000. There was no other bidder. A certified check for $25,000 was deposited and the balance is to be paid within fourteen days from the time the sale is confirmed by the court.

The sale includes all the real estate, fifteen acres, the big factory buildings, machinery and equipment of the plant and the cash on hand with the receivers July 19, amounting to $229,186.65. The purchasers assume the liabilities of the receivers incurred in the operation of the plant.

Wilbur C. Walker will undoubtedly be the head of the establishment in the future. Associated with him will be his brother Charles E. Walker of the Walker Barkman Mfg. Co., this city. Several Hartford people will be financially interested.

A new company will be formed and it is understood that the capitalization will be $1,600,000 of which $800,000 will be common stock and $800,000 preferred. The outside financial interests which have underwritten the purchase price will no doubt be retired.

Automobile Securities on New York and Detroit Exchanges

	1914 Bid	1914 Asked	1915 Bid	1915 Asked	Wk's Ch'ge
Ajax-Grieb Rubber Co. com	220	..	300	..	..
Ajax-Grieb Rubber Co. pfd	120	..	101	110	..
Aluminum Castings pfd	98	100	98	100	..
J. I. Case pfd	82¼	85¼	70	79	..
Chalmers Motor Co. com	100	103	91	93	+1
Chalmers Motor Co. pfd	94	96	95	98½	—1
Electric Storage Battery Co	50½	51	53	54	+ ¼
Firestone Tire & Rubber Co. com	310	315	506	512	+6
Firestone Tire & Rubber Co. pfd	108	110	109	111	..
General Motors Co. com	91	92½	188	189	+32
General Motors Co. pfd	91½	93	104	105½	+3½
B. F. Goodrich Co. com	25¼	25¾	50	52	—1
B. F. Goodrich Co. pfd	88	90	104	105½	+ ½
Goodyear Tire & Rubber Co. com	170	175	270	273	..
Goodyear Tire & Rubber Co. pfd	97	98½	105½	107	— ½
Gray & Davis, Inc., pfd	98	102½	92	96	..
International Motor Co. com	..	3	17	19	+4½
International Motor Co. pfd	3	9	43	45	+8
Kelly-Springfield Tire Co. com	54	56	155	157	—6
Kelly-Springfield Tire Co. 1st pfd	76	80	85	87	— ½
Kelly-Springfield Tire Co. 2d pfd	94	100	155	165	—5
Maxwell Motor Co. com	14½	14¾	36	38	+2
Maxwell Motor Co. 1st pfd	43½	44½	83	85	+1
Maxwell Motor Co. 2d pfd	17	18½	32	34	+1¼
Miller Rubber Co. com	..	..	190	192	..
Miller Rubber Co. pfd	..	..	103	105	..
New Departure Mfg. Co. com	124	126	..	..	..
New Departure Mfg. Co. pfd	105	108	..	..	..
Packard Motor Car Co. com	103	112	110	115	..
Packard Motor Car Co. pfd	97	100	96½	100	+ ½
Peerless Motor Car Co. com	10	17	..	..	..
Peerless Motor Car Co. pfd	..	50	..	..	..
Portage Rubber Co. com	..	30	35	38	..
Portage Rubber Co. pfd	..	90	92	95	..
*Reo Motor Truck Co	11½	12½	15	16	— ¼
*Reo Motor Car Co	18	19	29½	31	— ½
Splitdorf Electric Co. pfd	40	50	..	..	..
Stewart-Warner Speed. Corp. com	51	52	66	67½	—1¼
Stewart-Warner Speed. Corp. pfd	99	101	104	106	—1
Studebaker Corporation com	30½	31½	81	83	+4
Studebaker Corporation pfd	83	86	99	101	..
Swinehart Tire & Rubber Co	85	87	77	78	..
Texas Company	139	140	132	133	+6
U. S. Rubber Co. com	56	56¾	45	47	..
U. S. Rubber Co. pfd	101	102	103	105	—1½
Vacuum Oil Co	217	220	198	202	+5
White Company pfd	107	110	103	108	..
Willys-Overland Co. com	89	91	137	139	+14
Willys-Overland Co. pfd	94	96	102	103	+1½

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	1914 Bid	1914 Asked	1915 Bid	1915 Asked	Wk's Ch'ge
Chalmers Motor Co. com	..	101	..	92	— ½
Chalmers Motor Co. pfd	94	95½	94½	97	—1
Continental Motor Co. com	..	180	195	..	..
Continental Motor Co. pfd	..	75	82	84	—2
General Motors Co. com	90	92½	187	192	+32½
General Motors Co. pfd	91	94	104	105½	+3¼
Maxwell Motor Co. com	14	15	36	38	+2
Maxwell Motor Co. 1st pfd	43	46	82½	84½	+1
Maxwell Motor Co. 2d pfd	17	19	33½	36	+2¾
Packard Motor Car Co. com	..	112	110	115	..
Packard Motor Car Co. pfd	97	99¼	96¼	..	..
*Reo Motor Car Co	19½	20¾	30	31	+ ½
*Reo Motor Truck Co	12⅛	13	15¼	16	..
Studebaker Corporation com	..	..	81	83	+3¾
Studebaker Corporation pfd	..	..	99	101	+ ½

INACTIVE STOCKS

*Atlas Drop Forge Co	19	*..	..	26	..
Ford Motor Co. of Canada	..	..	1350	..	+75
Kelsey Wheel Co	185	..	205	..	..
*W. K. Prudden Co	..	20½	19½	21	..
Regal Motor Car Co. pfd	20	..	..	25	..

BONDS

General Motors, notes, 6s, 1915	100	100¼	..	..	..
Packard Motor Co. 5s, 1916	95	98½	98¼	..	..

*Par value $10; all others $100 par value.

To Continue Briggs-Detroiter

Detroiter M. C. Co. Formed —$48,000 Bid for Plant Refused by Trustee

DETROIT, MICH., July 17—The business of the Briggs-Detroiter Co. is to be continued, according t a statement made by A. O. Dunk, president of the Puritan Machine Co., who purchased the personal property of the bankrupt automobile company in the bankruptcy court July 15. The Detroiter Motor Car Co. has been formed with Mr. Dunk as president and it is said that officials of the new concern are now operating the service, parts and manufacturing departments. Frank M. Eldredge has been appointed advertising manager.

The real estate, consisting of the plant and land, was also offered for sale by the trustee, the Detroit Trust Co., but as only $48,000 were offered, and this was considered too low, the offer was not accepted. It had been provided that the trustee could sell the property for not less than $75,000 without the referee's approval, also that no offer for less than $63,000 was to be accepted without first giving notice to the creditors. A first dividend of 10 per cent is to be paid soon.

In the report furnished by the Detroit Trust Co., receiver for the bankrupt Briggs-Detroiter Co., the details as to the assets of the latter concern are given as in the accompanying table.

The Briggs-Detroiter Co. made and shipped 1100 four-cylinder cars in 1912. 2750 in 1913; 1600 in 1914. While, until it went into the hands of the receiver this year, it had made and shipped 450 four-cylinder cars and 280 eights.

Claims All Mercedes Cars Were Made for War Help

LONDON, ENGLAND, July 19—A statement has been made by a former German prisoner who has just arrived in this city that all German Mercedes cars were built for war help. C. B. Pray, an American automobile mechanic, states that his work up to the time of his arrest brought him into daily contact with the German Mercedes car. The chassis of every car of the 1912, 1913 or 1914 models was perforated at the sides with two sets of four holes each, at equal distances from the front and rear, for the purpose of riveting over the chassis frame a plate heavy enough to bear a weight of 1000 kg.

In May and June, 1914, the cars were called in for inspection and returned with the plates mentioned duly affixed without the owners' knowledge of what had been done. When the cars were requisitioned for war only the tops had to be ripped off and guns and searchlights mounted in their places.

Oldfield Gets Delage Racer

CHICAGO, ILL., July 20—*Special Telegram*—One of three Delage cars built for the 1914 French Grand Prix arrived in Chicago to-day and was turned over by its purchaser, David G. Joyce, chairman of the A. A. A. Touring Bureau, to Barney Oldfield, who will enter at Elgin and fall speedway meets.

Oldfield this afternoon challenged Resta to a 100-mile match race to be run on Chicago Speedway Aug. 7, and posted a $2,500 side bet.

Three Duesenbergs at Des Moines

DES MOINES, IOWA, July 17—Fred Duesenberg, builder of the Duesenberg racing cars, announces that O'Donnell, driving a Duesenberg with 360 cu. in. of cylinder displacement, will go out after a new 100-mile record on a mile track at the formal opening of the new Des Moines Speedway on July 25 when Barney Oldfield, driving a Christy front drive car, will go after records for the 1, 5 and 10 mile distances. Earl Cooper will come to Des Moines with O'Donnell for the July 25 event.

Three Duesenberg cars are entered for the 300-mile event on the new speedway on July 31. Two of the drivers for Duesenberg will be O'Donnell and Alley. Oldfield also is entered in the 300-mile event as well as De Palma. Rickenbacher, may be in the race at the wheel of a Duesenberg since the two Maxwell entries for the event have been withdrawn.

Tent for Indianapolis Show

INDIANAPOLIS, IND., July 15—The Indianapolis Automobile Trade Assn. will use a tent, 150 by 330 ft. in size, for the automobile show at the State fair, Sept. 6.

Assets of Briggs-Detroiter Co. From Receiver's Report

	Book Inventory	Inventory	Appraisal, Going Concern	Appraisal, Liquidation
Real estate	$89,111.36	$89,111.36	$63,500.00	$63,500.00
Materials, supplies, autos, finished and in process	265,825.44	121,135.74	75,000.00	53,024.65
Machinery, tools, equipment	10,623.41	12,980.33	8,179.40	5,333.85
Patterns, dies, special tools, service rights	184,741.52	34,741.52	25,000.00	10,000.00
Office furniture	2,557.97	2,557.97	1,750.00	1,417.80
Accts. and notes receivable	89,977.57	89,977.57	7,500.00	4,448.61
Auto Board of Trade rights	183.34	.....	.....	.....
Capital Body Co. note prepayments	14,000.00	14,000.00	Not appr'd	Not appr'd
	$657,021.61	$364,687.83	$181,112.74	$137,724.91

Stutz Not to Quit Racing

Co. to Enter Three Cars at Elgin—Disapproves of DePalma's Plan

CHICAGO, ILL., July 17—E. C. Patterson of Chicago, backer of Ralp DePalma in his racing campaign, to-day purchased one of the 300-in. cars made by Harry Stutz for this year's contests and driven by Howard Wilcox at Indianapolis and Chicago. Before to-day's deal was consummated, the car was entered in the Elgin road races by DePalma, who has secured Caleb Bragg to pilot it.

The outright purchase of the car by Patterson is the result of a deal in which Stutz offered DePalma the management of the Stutz team. The Italian consented to take over the cars provided he could campaign them with his Mercedes but the Indianapolis maker refused to agree to any such arrangement. The sale of the Stutz to Patterson does not mark the retirement of the Stutz company from racing. It has two cars on hand, one at the factory and the other on the Pacific coast, and is building a third at the present time. All three cars will be entered at Elgin, according to Stutz, and in the fall speedway meets.

1916 Tacoma 1-Day Event with 300 or 350-Mile Race

TACOMA, WASH., July 15—It was decided by the directors of the Tacoma Speedway Assn. at a meeting held July 12 that Tacoma's automobile races for 1916 will consist of one big race of 300 or 350 miles, and the Inter City race, both to be run on one day and with the big sum of $10,500 in prizes for the one main event alone.

After going over the financial results of the recent races the officials expressed themselves as well pleased with the receipts of the races this year.

In addition to deciding upon the one day of racing with the two events, the directors decided to offer an additional cash prize at the end of each 100 miles of the main event to the driver who is leading the race at that time. This is to be done in order to insure a faster race and prevent any possible lagging of the drivers.

The chief reason for deciding upon the one day of racing is that to make speed in the main race many cars are so badly damaged that they cannot compete in the second day's events. The directors wish the Montamarathon to be a race of speed in which the best drivers of the country will put their cars and individual cunning, prowess and endurance.

For the Inter City race the prizes awarded will be separate from those of

the Montamarathon. Dates for the Tacoma races will be fixed at the fall meeting in October of the directors of the Speedway Assn. of America.

It was also decided to put a heavy guard rail about all the curves on the Tacoma speedway before the 1916 races.

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To Hold Circuit of Twenty-five Races

UNIONTOWN, PA., July 15—For the purpose of holding a series of races in Pennsylvania and adjoining States, a number of men, including I. P. Fetterman, A. C. Smith of Pittsburgh, G. B. Gardner of Beaver, and C. W. Johnson of Uniontown, recently attended a meeting held at the Standard Auto Garage, this city, where contracts were signed to give permission for their cars to be entered in every race that will be held by the Automobile Racing Association this season. This association will receive its sanctions from the A. A. A.

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Exposition Automobile Week

SAN FRANCISCO, CAL., July 14—Chas. B. Lewis, who for some time has had charge of some of the exhibits in the automobile section of the Palace of Transportation at the Exposition here, has recently been made president of the Automobile Association of the Transportation Palace P. P. I. E. This association is now making arrangements for an automobile week in September.

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Denver-to-Cheyenne at 41.2 M.P.H.

DENVER, COL., July 17—A new record for the 112 miles between Denver and Cheyenne was established to-day in the road race staged by two Denver dailies with the aid of the Denver Motor Club. The event was an informal unsanctioned contest and was a kind of Denver greeting to the Cheyenne Frontier Day Celebration which opens next week. J. J. McIllwee drove a Hudson six the 112 miles in 2 hr. and 43 min. 29.3 sec., a speed of 41.2 m.p.h. as compared with the old record of 2 hr. and 49 min. Leon Nelson, driving a Metz, was second in 2 hr., 54 min. and 45 sec. The Saxon was third in 3 hr. and 8 min. Twenty-five cars were entered in the contest.

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24-Hours Saxon Parts Service

DETROIT, MICH., July 15—At the dinner given to the Saxon dealers who came here to take part in the economy run and driveaway which was held to-day, factory manager C. C. Cross announced a 24-hr. service on parts.

President H. W. Ford addressed the dealers principally pointing out the importance of economy runs and the facts they demonstrate. Chief engineer R. E. Cole, spoke from an engineering point of view about the Saxon car.

The driveaway was pronounced a great success, 105 dealers starting.

Only Passenger Cars in Yellowstone

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Regulations Fixed—$5 Fee for Runabouts, $7.50 for 5- and $10 for 7-Passenger Cars

WASHINGTON, D. C., July 17—Complete regulations governing automobiles in the Yellowstone National Park from August 1, the date on which the park will be thrown open to the use of automobiles, have been issued by the Department of the Interior. Only passenger vehicles are admitted, motorcycles not being allowed in the park. Tourists entering the park are required to secure tickets of passage which cost $5 for runabouts, $7.50 for five-passenger cars and $10 for seven-passenger cars. Such fees are charged for each trip through the park. Speeds are set at 12 m.p.h. ascending grades, 10 m.p.h. descending and 8 mi. when approaching sharp curves. On good roads with straight stretches and with no teams nearer than 200 yards a speed of twenty miles is permitted.

Automobiles while in motion must keep 100 yards apart except for purposes of passing other cars which is only allowed on level and straight stretches. Cars must keep their gears in mesh constantly except when changing; in other words, coasting is not permitted.

Horse vehicles are really given the right of way and when teams, saddle horses or park trains approach the automobiles are required to take the outer edge of the roadway regardless of the direction in which they are traveling. In case of road difficulties automobiles will be backed or otherwise handled to permit the horse teams to pass safely. Automobiles must pass animals on the road at not greater than 8 m.p.h.

Schedule by Checking Stations

In order to see that all automobilists using the park do not exceed the speed limit a complete schedule of travel throughout the park has been adopted and a series of checking stations established at the hotels so that the park authorities can determine if an automobile is exceeding the speed schedule, in which case he is fined fifty cents per minute for each of the first five minutes he is ahead of schedule at any point; $1 per minute for each of the next twenty minutes, and $25 fine or ejection from the park or both, in the discretion of the park superintendent, for being more than twenty-five minutes early.

To Test Brakes

All automobilists will be given a preliminary examination of brakes, tires, etc. The brake test will require skidding of the rear wheels on either set of brakes. Gasoline can be secured at regular stations in the park.

In case of accidents to the car on the park roads the cars must be taken off the road, or if this is impossible they must be placed at the outer edge of the road. Cars will not be permitted for use on local trips around Hot Springs formation or other points off the main roads. Horns must be sounded on approaching curves. Automobiles may leave the park by any one of the authorized routes.

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Beardsley Travels 1500 Miles in 14 Days on 14 Charges

LOS ANGELES, CAL., July 13—Traveling more than 1500 miles in 14 consecutive days on fourteen charges, a stock model Los Angeles-built Beardsley electric has completed one of the most remarkable electric runs ever held in the West. On the entire run, the average was 107½ miles to the charge.

The announcement was recently made by the Beardsley Electric Co., of this city that a stock model brougham would attempt to run 1000 miles in 10 days on ten charges. To show the ease of operation, Mrs. V. S. Beardsley was appointed pilot for the test and the press appointed ten observers, all women, to accompany the car on each day of the run.

In 10 days Mrs. Beardsley had run up a total of 1066.3 miles, every day's run exceeding the 100-mile mark.

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Racing for South America

NEW YORK CITY, July 21—Automobile racing is to be introduced in several South American cities within a year. A 2½-mile track, it is said, will be built. Plans for a purse of $100,000 for its first race, which is to be over a distance of 500 miles, have been offered. Speedways will be constructed in a number of cities of South America.

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300-Mile Track Race for Juarez

EL PASO, TEX., July 20—The El Paso Auto Club has applied to the A. A. A. for a sanction for a 300-mile automobile race to be run over the track of the Jockey Club Juarez, in Juarez, Mex., the last week of September.

It is the intention of the promoters of the race to bank the turns heavily so as to make them safe.

Purses aggregating $5,000 will be hung up to be competed for in the several races which, in addition to the proposed 300-mile race, will make up the three-day program now in mind.

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Forty Inter-States a Day

MUNCIE, IND., July 16—The Inter-State Motor Co. to-day manufactured forty cars which is double the capacity of two weeks ago.

"Get Cash, Pay Cash"—Ford

Answers Bankers' Questions on Country Bank Problem as to Automobile Loans

MILWAUKEE, WIS., July 19—Henry Ford told the Wisconsin Bankers' Assn. at its annual convention in Milwaukee, July 13-17, what he thinks of the responsibility of motor car builders to the bankers of the country. In reply to the question, "The Country Bank's Problem As to Automobile Loans," Mr. Ford promulgated a "Get Cash, Pay Cash" slogan and struck straight from the shoulder on a topic which has apparently been of deep concern to bankers of the country since the motor car was first built in quantities.

Does Not Believe in Credits

"You say that you feel automobile manufacturers will soon find it necessary to assist in financing the sale of their product in some such way as the manufacturers of farm machinery are obliged to do," says Mr. Ford's letter. "So far as I am concerned, I have never been able to determine just what is the difference between paying your debts now or putting them all off to some future time. Why should time be extended on farm machinery or motor cars until they are practically worn out, any more than time should be extended on the purchase of horses or cattle? I know that time is extended on cattle where they grow in value themselves, but I do not know of any system whereby horses are purchased on credit and paid for after they are dead or the best part of their usefulness worked out.

"It has always seemed that this putting off the day of payment for anything but permanent improvements was a fundamental mistake.

"The Ford Motor Co. is not interested in promulgating any plan which extends credits for motor cars or for anything else," continues Mr. Ford. "The farmer gets cash for everything he sells, and yet expects to buy everything on credit. The country banks complain about our taking the money out of their districts. The farmers have the habit in many sections of the country of holding their crops for better prices and then they want the farm implement manufacturer and the banks to carry the load while they are waiting for better prices.

"This trouble you speak of seems to be largely due to the farmers themselves, and I can see no reason why they should be encouraged in this. The country bankers should not expect to make more than a reasonable return on their capital and therefore should not expect to carry more loans, whether on farm implements or on motor cars, than their capital and deposits permit. If the country banks want to carry these loans themselves, why not increase their capital stock to enable them to do so? It is my opinion that many of the country banks could sell a good deal of their paper to Milwaukee banks.

"The manufacturer should have cash as well as the farmer. The manufacturer pays out enormous sums in cash for wages and he gets no extended credits on any of his material. The manufacturer cannot pay cash to labor; cannot pay for merchandise in thirty days and extend credits to purchasers of motor cars for months and sometimes years."

The discussion on motor car loans during which the Ford communication was read was one of the most important before the convention. It was brought out that to-day in Wisconsin there is an investment of $70,000,000 in automobiles, 90 per cent of which has been withdrawn from banks, either by withdrawal of deposits, money borrowed or notes purchased. This condition has caused a shortage of capital.

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Semaphore Traffic Plan Tried in New York

NEW YORK CITY, July 20—A system of regulating traffic by semaphores was tried yesterday in Fifth Avenue between Thirty-third and Thirty-seventh Streets and was pronounced successful.

A semaphore at Thirty-fourth Street regulated similar semaphores on the four other crossings and traffic was permitted to travel first north and south, then east and west for a period estimated as that required for an automobile to travel the five blocks at 12 m.p.h.

A change was made also in the turns and automobiles traveling north and wishing to turn west passed south of the semaphore instead of north after reaching the middle of the street.

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S. A. E. Could Aid on War Board

NEW YORK CITY, July 21—Automobile engineering circles are widely aroused over the fact that the Society of Automobile Engineers has not been invited to select two members to serve on the proposed naval advisory board which Secretary Daniels is forming, and to which eight engineering societies have been invited to select two delegates each. There is no question but that the S. A. E. could lend valuable aid, particularly in the motor transport work, which is proving to be such a potent factor in the present war. In England the Institute of Automobile Engineers has been a great assistant to the navy and war departments and in America the S. A. E. can lend similar aid. Standardization is a work that is needed and the S. A. E. has demonstrated its leadership in the matter.

Unquestionably the war department will follow the steps of the navy in organizing a war department advisory board and on such a board the automobile engineer would be of peculiar value because of the importance of motor transport not only for troops and commissary, but also heavy artillery, etc.

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Lux Wins Chalmers Sales Contest

NEW YORK CITY, July 19—At the conclusion of the Chalmers Spring Sales Contest yesterday, the most successful sales contest ever conducted by this company, Leo Lux, Chalmers dealer at Wadsworth, Ill., was awarded a five-passenger Light Six touring car, the grand sweepstakes prize. Mr. Lux made the remarkable record of selling 697 per cent of his quota between April 19 and June 30.

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Rajah Plugs on 1916 Cadillac

DETROIT, MICH., July 19—The Cadillac Motor Car Co. has contracted with the Rajah Auto Supply Co., Bloomfield, N. J., for its spark plug equipment for 1916. This means that some 130,000 to 150,000 Rajah plugs will be supplied.

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Garlent King Factory Manager

DETROIT, MICH., July 19—J. E. Garlent has been appointed factory manager of the King Motor Car Co. and will cooperate with assistant general manager J. F. Siegfried. Mr. Garlent was until recently general superintendent of the Hupp Motor Car Co.

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Stevens-Duryea Parts Business Intact

CHICOPEE FALLS, MASS., July 19—The parts business of the Stevens-Duryea Co. is still intact and the manufacture and sale of parts continue under the management of Wm. M. Remington, Chicopee Falls.

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Rouze Knox Motors Sales Manager

SPRINGFIELD, MASS., July 15—C. F. Rouze has been appointed sales manager of the Knox Motors Associates, the sole distributors of the products of the Knox Motors Co. Mr. Rouze succeeds H. F. Blanchard.

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Drumpelmann with Chalmers

DETROIT, MICH., July 20—The Chalmers Motor Co. has appointed W. J. Drumpelmann as its Eastern district manager. Until quite recently Mr. Drumpelmann was with the Olds Motor Works, Lansing.

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Wilcox with Republic Truck

DETROIT, MICH., July 19—G. D. Wilcox, for 4 years advertising manager of the Regal Motor Car Co., has become advertising manager of the Republic Motor Truck Co., Alma, Mich.

Factory Miscellany

To Manufacture Accessories. — The Fitzgerald Noble Co., Richmond, Cal., is to build a factory to manufacture automobile accessories.

McCurdy to Make Tractors—W. H. McCurdy, president of the Hercules Buggy Co., Evansville, Ind., will organize a new concern for manufacturing farm tractors.

To Make Tops—The National Limousine Top Corp., Buffalo, has leased factory premises at 41 Letchworth Street, and is equipping it for the manufacture of automobile tops, etc.

Burd Increases Factory—The Burd High Compression Ring Co. is beginning the installation of machinery in an additional new factory building, containing 30,000 sq. ft. of floor space.

Standard Tire Begins Plant—The Standard Four Tire Co., Keokuk, Iowa, of which W. J. Richards is general manager, is about to begin construction of a factory for the manufacture of tires.

Rands' $20,000 Addition—The Rands Mfg. Co., Holden Avenue, Detroit, Mich., manufacturer of windshields, has awarded the contract for the construction of a three-story concrete addition to its plant, to cost $20,000.

Ford Band Goes to the Coast—The Ford motor band, consisting of fifty-five skilled musicians, left for an extended tour to the Pacific Coast on July 20. Every member of this band is on the factory payroll of the Ford Motor Co., and this transcontinental tour to the San Francisco and San Diego expositions is complimentary.

Service Gear & Machine Co. Incorporated—The Service Gear & Machine Co., Reading, Pa., was recently incorporated in the State of Pennsylvania for $20,000. The company is manufacturing parts for service stations and parts jobbers, and makes a specialty of manufacturing transmission gears, bevel gears, axle shafts, piston pins, etc.

Wadsworth Buys Land—The Wadsworth Mfg. Co., Detroit, Mich., recently organized with a capital stock of $250,000, has purchased a large tract of land on Jefferson Avenue, on which the company will erect a modern four-story factory, 240 by 260 ft. The firm manufactures and sells automobile tops, bodies and accessories.

Herbrand to Add—The Herbrand Co., Fremont, Ohio, will build a $20,000 addition to its plant. An enlargement of the factory has been made necessary by large orders for automobile parts from the Ford Company of Detroit and other concerns. The company is so rushed with orders that a three-shift working schedule has been adopted.

To Make Gasoline Device—The Stephan Mfg. Co., Freeport, Ill., has been incorporated and will sell automobiles and accessories. Fred Rice is president; Howard Rice, vice-president; A. M. Stephan is secretary, and Mrs. B. B. Stephan, treasurer. A gasoline saving device, invented by Secretary Stephan will be manufactured and distributed.

Atlas Foundry to Build—The Atlas Foundry Co., Detroit, Mich., manufacturer of castings for automobile parts, will erect a large factory on Artillery Avenue, to be 270 by 85 ft., and of steel frame construction, at an estimated cost of $25,000. The foundry will be equipped with a traveling crane of five tons capacity, and other modern improvements.

McGraw Tire Adds—Expansion of the business of the McGraw Tire & Rubber Co., East Palestine, Ohio, will mean the employment of probably 1000 more people. The company has asked the Municipal Council to vacate several streets in the vicinity of the plant, so that large additional buildings may be erected. The company is composed of local and Pittsburgh men.

Hartford Machine Leases Plant—The Hartford Machine Screw Co., Hartford, Conn., has leased the brick plant formerly occupied by the Hartford Dairy Co. and more recently by the Pratt & Cady Co. Alterations are now being made and will be completed about the middle of August, at which time the company will move in new machinery for light manufacturing. The building is of brick, two stories and basement, and comprises 48,000 sq. ft. of floor space.

To Make Steel Specialties—Howard Mann, who recently purchased the abandoned Burrell factory in Bradley, Ill., has commenced the manufacture of steel specialties for automobiles. The old plant has been improved and altered, 10,000 sq. ft. of concrete flooring being laid. Mann has contracts amounting to $50,000, which will take the output of the first year. New machinery has been installed at an expense of $3,000. A new line which may be added later will give employment to 150 additional men.

Pittsfield Coil in New Plant—The Pittsfield Spark Coil Co., Dalton, Mass., has secured a brick factory, three stories and basement, in Pittsfield, Mass., the city where the company originated twelve years ago, and will move the plant to the new quarters immediately. All correspondence, inquiries and orders hereafter should be sent direct to the Pittsfield Spark Coil Co., Pittsfield, Mass., to avoid delay, or ordered from any of the branches of the Western Electric Co., who are the distributing agents of the Pittsfield Spark Coil Co.

The Automobile Calendar

July 31.....Des Moines, Ia., Speedway 300-Mile Race.
Aug. ..... Milwaukee, Wis., Independent Petroleum Marketers' Assn. of the U. S.; 1915 Convention in Milwaukee.
Aug. 2-3..... San Francisco, Cal., Tri-State Good Roads Assn., Third Annual Convention.
Aug. 20-21.....Elgin, Ill., Road Races.
Aug. 30.....Columbus, O., Show, Ohio State Fair, Columbus Auto. Show Co.
Sept. .....Peoria, Ill., Second Northwestern Road Congress.
Sept. 4.....Minneapolis, Minn., Track Race; Twin City Motor Speedway Co.
Sept. 6.....Providence, R. I., Speedway Race; F. E. Perkins.
Sept. 6-10.....Indianapolis, Ind., Show, Indiana State Fair.
Sept. 8-11.....Hamline, Minn., 2-Day Meet at State Fair Grounds between Minneapolis and St. Paul, State Fair.
Sept. 13.....Oakland, Cal., Pan-American Road Congress.
Sept. 17-18.....Peoria, Ill., Illinois Garage Owners' Assn. Convention.
Sept. 18-25.....Los Angeles, Cal., Show, Shrine Auditorium.
Sept. 20-25.....San Francisco, Cal., International Engineering Congress.
Sept. 24.....Indianapolis, Ind., S. A. E. First Section Meeting.
Oct. 1-2.....Trenton, N. J., Track Races; Inter-State Fair.
Oct. 2.....New York City, Sheepshead Bay Motor Speedway Track Meet.
Oct. 3-16.....St. Louis, Mo., Show, Forest Park Highlands, St. Louis Automobile Manufacturers and Dealers' Assn.
Oct. 6-16 .....New York City, Ninth Electrical Exposition and Motor Show at Grand Central Palace.
Oct. 11-12.....Dayton, O., National Paving Brick Manufacturers' Assn., Annual Meeting.
Oct. 16.....Chicago, Ill., 300-Mile Race.
Nov. 18..... Arizona 150-mile Grand Prix.
Dec. 31..... New York City, Show; Grand Central Palace.
Jan. 22, 1916....Chicago, Ill., Show; Coliseum.
March 4-11.....Boston, Mass., Truck Show, Mechanics Bldg.

The Week in the Industry

White in Vulcanizing Business—C. E. White, owner of the Model Vulcanizing Works at Flower and Twelfth Streets, Los Angeles, Cal., has formed a partnership with H. H. Holmes and opened a tire house and vulcanizing plant at 912 South Olive Street, doing business under the name of the Olive Vulcanizing Works.

Fishleigh Joins Los Angeles Apperson—W. T. Fishleigh, until recently at the head of the automobile department of the college of engineering at the University of Michigan, has been appointed head of the technical department of the Los Angeles Apperson branch, which controls the entire California, Arizona and Nevada territory.

Take on Grant Six—Ralph Jernberg and F. E. Wheeler have formed a company to handle the Grant six at Worcester, Mass., with salesrooms at 18 Wellington Street. Mr. Jernberg was formerly with J. C. Harvey, Worcester agent for the Haynes, and Mr. Wheeler was a member of the sales force of the Grant company of Boston, Mass.

MacDonald Gets the Jackson—J. A. MacDonald, who resigned as president of the Providence Motor Car Co., Providence, R. I., the company having temporarily left the automobile business, has taken on the agency for Jackson cars in Rhode Island. He is making his headquarters at the Broadway Garage on Dean Street. The Providence Motor Car Co. will continue its tire business at a new stand on Empire Street.

Garage

Grand Rapids Station Opens—The Peck Auto Sales Co., Studebaker agent, Grand Rapids, Mich., has opened its new service station and repair shop, Island and Ionia Avenues.

Des Moines Co. Moves—The Leachman-Claiberne Co., Des Moines, Iowa, will move this fall from its present location at Eighth and Mulberry Streets to new quarters at Eleventh and Locust Streets.

Decatur Garage Opens.—B. H. Asher and A. L. Arnold have opened a new garage and repair shop in Decatur, Ill., specializing on the Ford. The firm has leased the building at 712 North Broadway.

Cal. Chalmers' Territory Expands—The L. H. Rose-Chalmers Co., recently established in San Francisco, Cal., to distribute the Chalmers, has opened on automobile row. The company has established sales and service branches in San Francisco, Oakland and Sacramento.

Motor Men in New Roles

Kelly Fisk Mgr.—D. B. Kelly has been appointed manager of the Louisville service station and repair shop of the Fisk Rubber Co., 941 Third Street.

Bragg Makes Change—F. L. Bragg, formerly retail sales manager of the Overland-Connecticut Co., has accepted a similar position with the J. H. Stuart Co., Burlington, Vt., Overland distributor.

Formigle Resigns—O. L. Formigle has severed his connections as assistant engineer of the Sheldon Axle & Spring Co., Wilkes-Barre, Pa., and will spend the summer at his home in Haddon Heights, N. J.

Rock Starter Inventor.—G. L. Rock, owner of the Jonesville Garage, Jonesville, Mich., has invented an automobile self starter and may interest local and Detroit people in promoting a company to manufacture the starter there or in Detroit.

Cadwell Sells Master Carbureter Interests—C. J. Cadwell has sold out his interests in the Master Carbureter Co. and is now connected with H. A. Miller of the Harry A. Miller Mfg. Co., Los Angeles, Cal., which will shortly bring out a new carbureter.

Canavan Sales Mgr.—J. J. Canavan, former member of the firm of Vance & Canavan, and controlling the agency for the Cartercar and Case lines in southern California and Arizona, has been appointed sales manager of the Pioneer Commercial Auto Co., Los Angeles, which has the southern California territory for the White.

Wiese Returns to Tire Business—J. F. Wiese of Los Angeles, Cal., has returned to the tire business. He has retired from the Winton branch and has formed a partnership with J. G. Boss, formerly in the tire business in Denver. Operating under the name of Boss & Wiese, a tire and repair business has been opened at 723 South Olive Street.

Donovan Baltimore Studebaker Mgr.—F. B. Donovan, Inc., has taken over the agency of the Studebaker in Baltimore. Mr. Donovan comes from Boston and is treasurer and general manager of the new company. A model service garage will be established with E. R. Maurer, formerly of the New York branch of the Studebaker agency, in charge.

Kalman Heads St. Paul Co.—The Twin City Motor Car Co., with quarters in St. Paul and temporarily at 719 Hennepin Avenue, Minneapolis, has elected the following officers: President, P. J. Kalman; vice-president and treasurer, J. P. Upham; secretary, W. G. Graves; sales manager, J. R. Histed; manager wholesale department, W. P. Abbey. A new building is being erected at Harmon Place and Willow Street.

Corson Back in Business—H. E. Corson, who retired from the automobile business last October after fourteen years of it in Springfield, Mass., where he had organized an agency and handled Ford cars, has gone back into the field again. He has formed the Corson-Berry Co. to handle the Studebaker line there, with headquarters at Winchester Square, State and Sherman Streets. John Mullarky, Jr., for ten years with Mr. Corson, has charge of the service department, and W. I. Stearns, Jr., until recently manager of the Blue Ribbon Garage, is outside salesman.

Cowan Sales Mgr.—W. K. Cowan, pioneer automobile dealer of Los Angeles, has been appointed sales manager of the William R. Ruess Co., distributor for the Mitchell and Stearns-Knight lines throughout southern California, Arizona and Nevada. Cowan took up the Waverley Electric in this territory in 1899. In 1902, when the first single cylinder Rambler car came out to the Pacific Coast, Cowan took on the agency and pioneered the automobile row there. Cowan continued to handle the Jeffery products until last fall, when he sold his interests and retired on account of ill health; but after a vacation he could not remain out of the industry and accepted the appointment at the head of the Ruess organization, succeeding J. H. McDuffie, who is now sales manager for the new Willys-Knight.

Dealer

Auto Parts to Enlarge—The Auto Parts Co. of Chicago, Ill., will enlarge both its radiator and top departments.

To Mfr. Pistons—E. W. Wridgway will manufacture the Zephyr pistons for automobiles under the name of the Wridgway Co., Wilkes-Barre, Pa.

Chicago Cole to Build—The Cole Motor Car Co., 2326 Indiana Avenue, Chicago, will erect a three-story service building, 50 by 161 ft., to cost $40,000.

Iowa Supply Co. Adds—The Iowa Auto & Supply Co., Des Moines, Iowa, will build a $10,000 addition to its plant. One floor of space of 9000 sq. ft. will be provided.